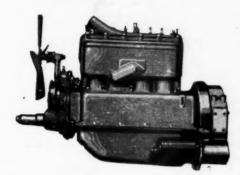
MOB

Number 11

PUBLISHED WEEKLY AT 239 WEST 39th STREET NEW YORK, MARCH 17, 1921

Thirty-five cents a copy

# The Change in the Automobile Market Favors the Four-Cylinder Car Manufacturer



N the present automobile situation, it is vital that the true condition of the market be recognized as one of transition.

The automobile market cannot permanently contract, it must inevitably expand, but just as inevitably the present slackening portends a change.

The buying public has reversed its attitude toward spending. Carelessness of basic values is being displaced by keener appreciation of the real essentials of car values and an increasing consideration of economical operation.

The car manufacturer who, today, rightly judges the changes that will lift the industry up to the next step of its progress will be the manufacturer who will be forced ahead by this buyer's market.

This buying factor of economy favors the manufacturer of a car equipped with a thoroughly developed four-cylinder motor, because he can produce completely balanced car value in comfort and essentials at a price range that would make him skimp with more cylinders.

This is the type of car that will appeal to the great group of average car buyers.

The Lycoming Motor is a fine four-cylinder motor, made in a great plant (one of the largest in the country), devoted entirely to the manufacture of just one type

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# AUTOMOTIVE INDUSTRIES

MOBILE .

Vol. XLIV

New York-Thursday, March 17, 1921

No. 11

# What Is the Average Life of Cars and Trucks?

Analysis of registration, production, export and import figures over a period of years leads to the conclusion that the average life of the 2,000,000 cars retired from service in last 7 years was about 5.3 years

By P. M. Heldt

S highway transportation develops and passenger cars and trucks become practically the sole means of road travel the proportion of first purchasers of cars and trucks in the total of car sales will decrease, and the demand for new cars each year will become more and more nearly equal to the number of cars which drop out of service. For this reason it is becoming increasingly important for the trade to know how many cars will be required for replacement of those withdrawn from service.

If we know the average life of a car or truck it is a simple matter to estimate the number required for replacement in a given year, but it is an easy matter to go astray in efforts to determine the average life.

For instance, one method of reasoning is as follows: "There is no reason why a car should not last indefinitely, because all wearing parts can be replaced, and in case of the breakage of any part, even if it be such an important one as the frame, it is always cheaper to buy a new part and substitute it for the broken one than to buy a new car."

This argument was put forth in a letter recently received from a company which makes a strong point of the fact that the aggregate price of all the parts going into its car is no greater than the price of the complete car. The proposition sounds quite plausible, but in practice things do not work out quite that way. The writer knows personally of a low-priced car that

was in service by a salesman for three years, during which time it traveled about 30,000 miles. It was then considered no longer sufficiently reliable for this rather severe class of work and the company owning it disposed of the machine for \$85.

For two years more it was used more or less by the new owner, who then found it so unsatisfactory that he bought a new car (of the same make). This car, therefore, if it had been retained in commercial service for its whole life, would have lasted less than  $3\frac{1}{2}$  years. This seems a short life, yet the service the car gave was considered quite satisfactory. It must be remembered that the car went out on the road day after day, summer and winter, and that its routes could not be selected according to road conditions, but were determined by business opportunities.

On the other hand, we often hear of cars that have been in service for 10 or 12 years and are still giving excellent service. For instance, a considerable number of Packard "eighteens" are in taxicab service in New York now, and as these cars were manufactured in 1909 and 1910, they are close to 12 years old. This illustrates the point that there is a great difference between the life of the average low-priced car and the average high-priced car. The high-priced car represents a large investment and this alone creates considerable aversion to scrapping it as long as it is at all serviceable. The better grade cars, moreover,

owing to the methods used in manufacturing them, do not acquire, at least to the same extent, that shabby appearance and rattly sound that are characteristic of most of the cheaper cars after several years of use. Furthermore, if the car is of a type that lends itself well to some commercial application, that in itself tends to prolong its life, because obsolescence of outward form and of certain mechanical features does not count against a car in these services nearly as heavily as in private use. Furthermore, a taxicab company can, for example, give the car the greater care needed in its advancing years more economically than the private owner.

Since 1912 AUTOMOTIVE INDUSTRIES has compiled annually statistics showing the number of cars registered in the different states, and the number of cars turned out by our factories has been ascertained by the National Automobile Chamber of Commerce. With these figures and the figures of imports and exports, obtainable from the Department of Commerce, as a basis, it should be an easy matter to approximate very closely the average life of all cars that have ceased to be used at a given date.

#### How Replacements Are Determined

The registrations have increased from year to year and the new cars put in service each year partly make up for cars which drop out of service and partly account for the increase in registrations over the past year. The number of cars newly put in service each year is equal to the American production plus the imports and minus the exports. In the accompanying table the production, exports and imports, and the deduced figure of cars newly put into service, are given for each year from 1905 to 1920. By subtracting from the registrations of one year the registrations of the previous year and subtracting the remainder from the cars newly placed in service during the year, we find the number of cars registered the previous year which were not registered during the current year-in other words those retired from service. For instance, in 1916 there were registered 3,585,000 cars and in 1915 2,480,000 cars. This makes the increase in registrations for the year

3,585,000 - 2,480,000 = 1,105,000. In 1916 there entered service in this country 1,503,000 cars, which is 1,503,000 - 1,105,000 = 398,000

more than the increase in registrations, hence that number were retired in the course of 1915.

The term "retired" as used above requires an explanation. These cars are not registered any longer but a large proportion are still in existence; their useful life has apparently come to an end, but in an emergency a considerable number of them can become active again. This was well illustrated in 1918 when the increase in registrations over the previous year was greater than the total number of cars produced. This was the last war year, when many people who wanted to buy cars . could not get them, owing to the restrictions on automobile manufacture and railroad transportation. Not being able to buy a new car, everybody evidently held on to his old one and-more than that-some of the previously "discarded" machines (including many, no doubt, placed in storage by owners absent during the war) were put in service again and figured in the registrations.

By the above method we can calculate the number of cars that disappeared or were retired for each year since 1912. This has been done and the figures are given in the table. It may here be remarked, parenthetically, that the average life of cars depends not solely upon their durability but also upon their liability to accident. Some

cars disappear after a year or two owing to serious collisions, fires, etc. On the whole these accidents probably do not greatly affect the average life, but whatever effect they have is taken account of in the following calculation.

The next step is to calculate from the registration, production and retirement figures the average number of years each car was registered. A distinction is here made between the length of time for which a car is registered and its actual life. This is necessary for the following reason.

During the first year some cars are registered for a whole year and others only for a month or two, because new cars are placed in service throughout the year, and if the end of the registration year is only a month or two off, the car has to be registered for that short period of time and counts as one of the cars registered that year. The active period of life represented by that registration therefore varies from a full year to a month or less, and it is not far wrong to assume that the average period is one-half year. During the last year of registration the car, of course, remains registered for the whole year, unless it should be destroyed by accident and the registration cancelled-which is a rather rare case. Therefore, the probability is that a car that appeared in the registration records for six years had an active life of about five and a half years.

Substantially the same result is arrived at by another method of reasoning. The great majority of the cars are put in service in the spring and are finally withdrawn late in the fall and as they count in the registration lists for both the first and the last year of their lives, although their active life is one-half year less than the number of registration years to their credit.

#### Cars Withdrawn From Service Each Year

Now let it be assumed that each car has a definite life such that it may be registered during six consecutive years. That is, whether it passes out of use through accident, through wear or through obsolescence, this occurs after it has been registered for six years. Then, since in 1910, for instance, there were placed in service 179,580 new cars, this exact number of cars would be registered for the last time in 1915. All cars placed in service previous to 1910 had already disappeared before 1915 and all placed in service subsequent to 1910 would be registered again in 1916. Therefore, in 1916 the number of registrations would be equal to the number of 1915 registrations, plus the number of cars placed in service for the first time in 1916, minus the number of cars manufactured in 1910. Thus by working backward, that is, by subtracting from the number of cars registered any one year, the number placed in service that year and then subtracting the remainder from the number registered the previous year we find the number of cars scrapped the previous year, and it is then only necessary to find out how many years earlier an equal number of cars were placed in service and add one, to determine the number of yearly registrations to the credit of each car. (One is added because the car is registered both the year it went into service and the year it was withdrawn.) For instance, in 1916 there were registered 3,585,000 cars and trucks and in 1915. 2,480,000 cars and trucks, which gives an increase of 1,105,000. As there were 1,503,000 new cars placed in service in 1916, the number of cars scrapped in 1915 was

1,503,000 - 1,105,000 = 398,000.

This figure is nearly midway between the numbers of cars placed in service in 1912 and 1913, which would lead

Total 2,089,247

to the conclusion that the average number of registrations of all the cars was

$$\frac{(1916-1912) + (1916-1913)}{2} + 1 = 4\frac{1}{2}$$

The above method of calculation can be applied equally well in actual practice, for, although the number of years that cars in actual use are registered is not a definite figure, the average number of registrations per car is definite. However, taking a single year, as above, gives rather unreliable results. For instance, in 1915 the last cars of the two-door type, with the old style of offset bodies and without lighting and starting equipment were getting along in years, and many cars that might have been used a year or two longer were discarded. Another factor that may have increased the number of retirements that year was that Fords sold for \$325 for runabouts and \$365 for touring cars, and these low prices may have induced many owners to dispose of their old cars sooner than they would otherwise have done. Other cars also were at the bottom prices during that year.

#### How True Average Results Are Obtained

This difficulty can be eliminated by taking, instead of a single year, a period of several years. The longer the period the more dependable the result. For instance, if we assume again that all cars have a life sufficient for six annual registrations, then all cars placed in service between 1906 and 1913, inclusive, would be scrapped between 1911 and 1918, inclusive. In this way the retirements are extended over periods of both high and low prices, of general prosperity and depression, of lack of factory capacity and of surplus capacity, and a true average, more or less independent of temporary economic conditions, is obtained.

The first year for which registration figures are obtainable is 1912. However, the number of cars which appear to have been scrapped in 1921 is exceedingly high, which may be due to errors in the compilation of the registration figures—a task which always involves many pitfalls. From 1913 on the number of cars retired annually increased fairly constantly until 1918, as would be expected from the constant increase in production. Hence the writer decided to disregard the result of the compilation of registrations for 1912.

It was shown in the foregoing that if the cars withdrawn any one year have a life of say, six years, then the number of cars withdrawn that year is equal to the number of cars newly placed in service six years earlier. As this relation holds for one year as well as for another, it follows that the number of cars withdrawn during a number of successive years is equal to the number of cars newly placed in service during an equal period of years which preceded the period during which the retirements took place by a time equal to the difference between the years of last and first registrations of each car. The total number of registrations of each car would be one greater than the numerical difference thus obtained.

From 1913 to 1919 inclusive, a seven-year period, there were withdrawn from service a total of 2,089,247 cars. It is now necessary to find an earlier seven-year period during which an equal number of cars were first placed in service, and the interval between these two periods then gives a measure of the average life of the cars, after a certain allowance has been made. This earlier period has to be found by trial and error.

During the seven-year period, 1908-1914, there were newly placed in service 1,942,073 cars. This is slightly

less than 2,089,247, the number withdrawn from 1913 to 1919. If the number of cars placed in service during this period had been equal to the number retired during the period 1913-1919, the interval between the year of introduction in service and the year of retirement would have been

1913 (1919) - 1908 (1914) = 5 years,

and the total number of registrations of each car would have been one more, or six. Since the number of cars introduced in service during the 1908-1914 period is slightly less than the number retired from 1913 to 1919, we have to take a later period, which makes the interval

STATI	STICS BY U	JSE OF WH	IICH AVER	AGE CAR	LIFE IS DET	ERMINED	
				No. of		No. of	
	No. of			Cars		Cars	
	Cars Pro-	No. of	No. of	Newly	Total No.	Retired	
	duced in	Cars	Cars	Entered	of Cars in	from	
Year	U. S. A.	Exported	Imported	Service	Service	Service	
1905	25,000			24,000			
1906	34,000	2,200	1,295	33,100			
1907	44,000	2,894	1,093	42,200			
1908	65,000	2,164	1,347	64,200			
1909	127,731	3,686	1,645	125,690			
1910	187,000	8,443	1,024	179,580			
1911	210,000	15,807	972	195,165			
1912	378,000	23,720	868	355,148	1,033,000	203,859	
1913	485,000	26,889	748	458,859	1,288,000	62,431	
1914	569,045	26,000	386	543,431	1,769,000	117,400	
1915	892,000	64,000	403	828,400	2,480,000	398,000	
1916	1,583,000	81,000	1,037	1,503,000	3,585,000	381,260	
1917	1,868,000	80,000	260	1,788,260	4,992,000	8,000	
1918	1,153,000	47,000	178	1,106,200	6,106,000	402,656	
1919	1,974,000	82,000	1,656	1,893,656	7,597,000	735,500	
1920	2,241,000	172,000	1,500	2,070,500	8,932,000		

measuring the average life of the cars smaller. During the seven-year period, 1909-1915, there were introduced in service 2,706,273 cars, which is very much greater than the number retired during the 1913-1919 period. If the number introduced during the 1909-1915 period had been equal to the number retired during the 1913-1919 period, then each car would have been registered only five times. Since the number of new cars of the 1908-1914 period is much nearer to the number of retirements of the 1913-1919 period than the number of new cars of the 1909-1915 period, it follows that the average number of registrations per car is much nearer to six than to five. The exact average number of registrations per car can be found by interpolation as fol-

Difference between numbers of cars placed in service in the 1909-1915 and the 1908-1914 periods

$$2,706,273 - 1,942,073 = 764,200$$

Difference between cars scrapped in the 1913-1919 period and cars placed in service in the 1909-1915 period

$$2,706,273 - 2,089,247 = 617,026.$$

Dividing the latter difference by the former,

$$617,026 \div 764,200 = 0.81$$
.

#### Actual Average Life 5.3 Years

From the above it is seen that the actual average number of annual registrations was 5.81. As above explained, the average active life of the car is one-half year less than this and is, therefore,

$$5.81 - 0.5 = 5.31$$
 years.

This was the actual average active life of all the cars that went out of service in the United States from 1913 to 1919 inclusive.

High grade cars will last considerably longer, espe-(Continued on page 594)

# Move to Unify All Interests in Hub Standardization Work

Ball and roller bearing makers, wood and metal wheel makers, axle manufacturers and others commercially interested join with S. A. E. representatives in meeting at Detroit for purpose of furthering efforts to standardize front axle hubs. Still hope to formulate standard adaptable to use of either ball or roller bearings thus avoiding possible deadlock.

By J. Edward Schipper

FFORTS at hub standardization are reaching a point where either definite and satisfactory progress will soon be made, or the situation will reach a deadlock which it may be impossible to break for years. The difficult part of the problem arises from seeming impossibility of securing a standard bore for front axles for trucks which is suitable for both ball and roller bearings. The reason for this lies in the fact that for similar capacities the outside diameters of the ball bearings are greater than those of the roller bearings. This alters so many material dimensions that it is extremely difficult, if at all possible, to arrive at a single standard for both.

Hope has not yet been abandoned on this matter, however, and a special committee of ball and roller bearing men is at work on the proposition at the present time for the purpose of reaching a final decision as to whether or not it is going to be possible to adopt a single standard.

It will be remembered that although the report of the committee on hub standards made at the winter meeting of the S. A. E. was accepted by the Truck Division of the Standards Committee, it failed to pass the Standards Committee as a whole, largely because of the opposition of ball bearing manufacturers who felt that they had not been given an opportunity to present their side of the matter. The report which was presented at that time, failed to include the qualification, that the proposed standard was solely for roller bearing front truck hubs, which the ball bearing manufacturers stated worked an injustice to their side of the business. As a result the matter was turned back to the committee for further consideration.

A meeting was called at the Detroit Athletic Club on March 3 by C. C. Carlton of the Automotive Wood Wheel Manufacturers' Association, at the instance of this association, the Society of Automotive Engineers and the Automotive Metal Wheel Manufacturers' Association. At this meeting, which was attended by an extraordinarily representative list of bearing and axle manufacturers, the fact was brought out that to date the two wheel associations had spent about \$20,000 in carrying the standardization work along. The object of Mr. Carlton's meeting was to enlist the support of the bearing and axle manufacturers who are as much or possibly even more interested in the work than the wheel manufacturers. This support is evidently to be given, judging by the attitude taken by representatives of manufacturers at the meeting, with the result that a committee is now at work to carry along the investigation for the purpose of determining whether or not it is possible to arrive at a single standard.

The report of this committee is of utmost importance

and is being awaited by wheel, bearing and axle manufacturers with considerable interest. Whether or not this work is to progress smoothly and rapidly, or whether it is to be deadlocked in the same way that ball and roller bearing work has become deadlocked in some of its details in other branches of standardization, will depend in large part upon the report to be made by this committee.

As matters stand at the present time, it is very likely that if it is impossible to arrive at a single standard, an effort will be made by axle and bearing manufacturers interested in roller bearing installations to bring out a standard adapted solely to roller bearing installation, as it seems very possible to do this in a way acceptable to all roller bearing and axle manufacturers, although the dimensions may not be ideal. In fact, it is very possible that these dimensions will never be really standardized, but will be accepted eventually as recommended roller bearing practice. No action is likely to be taken in this respect, however, until a report is secured from the ball and roller bearing committee which indicates whether or not it is going to be possible to arrive at a single standard.

#### Flange Diameter and Bolt Circle

In the meantime, it is probable that quick action will be taken on the standardization of flange diameters and bolt circles for wood wheel hubs. The wood wheel manufacturers are anxious to have this matter settled at the earliest possible date, as at present they are being compelled to meet small differences in dimensions which have no basis in engineering merit or necessity. A committee has been appointed also to take this matter under consideration and to attempt to have a report ready for the truck division of the Standards Committee at its meeting on March 15. It has been pointed out by the wood wheel manufacturers that they entered this question solely because of their interest in the flange diameter and bolt circles. After they had started this work they found that the metal wheel manufacturers were more vitally concerned with the bore of the hub and the bearing installation, and the standardization work was enlarged to meet all wheel interests. This has been carried along and it seemed, until the objections arose at the winter meeting of the S. A. E., that it was about ready for adoption.

One of the points which has been frequently brought up by critics of the hub standardization work is that it is the first effort of the Society to standardize a design. F. G. Hughes of the New Departure Co., brought forth some arguments at the meeting at the D. A. C., stating that he hesitated to have the S. A. E. standardize a design and,

furthermore, believed it to be impossible to use the load capacity as a basis, because the location of the center of gravity of the truck would have a marked influence on the dynamic stresses to be encountered by the parts. He stated that he believed it was perfectly possible to standardize the flange diameter and bolt circle, but did not believe it desirable to include a form and style of spindle, etc., on account of the great variation in dynamic stresses, due to the shift in center of gravity and other influences.

Cornelius T. Myers, consulting engineer, who has been retained by the wheel interests to carry out the detail work necessary for the formulation of these standards or recommended practices, stated that he had worked with a number of manufacturers and committees on this subject and found that they all believed it possible to standardize as far as roller bearings are concerned because of the immaterial differences in practice which exist. Regarding the question of bearing spacing in these front hubs, he stated that no engineering reason existed for the in-

finitesimal differences which prevail.

Myers said further that the subject of bearings was actively canvassed and studied for five months and it was the unanimous opinion of the sub-committee of five and of the Truck Division of the S. A. E. Standards Committee that ball bearings could not be made interchangeable in any series of hubs which could be laid down because there are fundamental differences in the design of ball and roller bearings which call for differences in dimensions which cannot be composed. quote Myers further: "The decision of these men to offer as the first step in the standardization program a series of hubs equipped with roller bearings was based on the fact that in the past two years some 95 per cent of the bearings used in the front hubs of motor trucks having load capacities of from 11/2 to 71/2 tons were roller bearings. All the prominent axle companies agreed that the designs submitted were in line with the best practice and should be followed in new construction. Four roller bearing companies can furnish interchangeable bearings for the proposed standard hubs. The bearings selected are cheaper than bearings now being used on well-designed axles for similar load capacities. The bearings selected are those which will be in quantity production by the roller bearing manufacturers.

"The subject of a standard series of hubs to take ball bearings should be considered by itself and submitted to the S. A. E. when all particulars with regard to it are thoroughly discussed and approved, not only by bearing manufacturers but by manufacturers of axles and of

motor trucks."

Myers gave it as his opinion that the success of the proposed standard would depend upon the favor with which it was received by the motor truck trade and not upon the individual preferences of any class of parts manufacturers. "If the proposed standards for roller bearing hubs appeal to the motor truck trade, parts manufacturers will certainly cater to this demand. If the motor truck trade is willing to pay 15 or 20 per cent more for roller bearings, hubs and wheels in order to adopt standards where ball bearings can be installed in hubs of the same dimensions, this is a matter for the motor truck trade to decide. Ball bearings would not be strictly interchangeable with roller bearings in any event, but the suggested type would allow axle manufacturers to machine the same hub castings by means of different tool equipment to take whatever type of bearing the customer wished.

"It is my opinion that the program already approved by the Truck Division of the S. A. E. Standards Committee should be given formal sanction so that 95 per cent of the motor truck trade would be able to take advantage of it, and that work should be carried on to place a similar series of hubs for use with ball bearings before the industry at the earliest possible moment; that to delay the adoption of the roller bearing series in the hopes of getting a really serviceable interchangeability with the ball bearing series would tend to continue the present condition of affairs in many new designs which are at present projected, namely, a multitude of small and unessential variations in design details, the sum total of which constitute a very considerable burden on the truck industry."

T. V. Buckwalter of the Timken Company, urged the adoption of a standard on an economic basis. He stated that it is more a problem of economics than of engineering. He said further that the static loads were the only basis which it was possible to use in making the design and that variations in center of gravity, etc., if they were exceptional, would have to be taken care of by special design

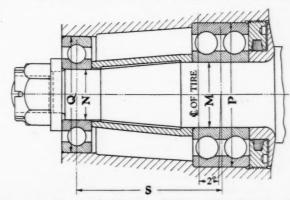
anyway.

Discussions of this kind occupied most of the day at the D. A. C. meeting. It was quite apparent that the general trend of opinion at the meeting was favorable to adoption of some form of standard or recommended practice, and if possible, a single standard for both the ball and roller bearings. There were a considerable number, however, who believed that the insistence on a single standard would deadlock the proposition in such a way that nothing would ever be accomplished.

F. W. Gurney of the Gurney Ball Bearing Co., stated in his belief it was by no means impossible to work out a single standard for the two types of bearings and asked that time to give this matter fair consideration be granted the committee, of which he is a member. This was agreed

to by all present.

Previous to this meeting at the D. A. C., the ball bearing interests had called a meeting of their own and had drawn up a set of suggested standards for ball bearing front hubs to be incorporated in the report to be made to the Standards Committee, so that in any event, both ball and roller bearings would be given consideration in this work. The proposals they make are incorporated in part in the table and cut given herewith. No action, however, will be taken on these ball bearing front hub dimensions until it is determined whether or not it is going to be possible to arrive at the single standard. The drawings of the ball bearing



Suggested standards for ball-bearing front axle hubs, proposed by representatives of the ballbearing manufacturers. Not yet adopted or acted upon

	Radial Outer learing	Row Inner Bearing			_Dimens	ions in Ir	nches	
Hub No.	No.	No.	M		N	P	Q	s'
5	307	309	1.7715		1.3778	3.9370	3.1496	4
6	308	310	1.9683		1.5746	4.3307	3.5433	414
7	309	311	2.1652		1.7715	4.7244	3.9370	41/2
8	310	313	2.5589		1.9683	5.5118	4.3307	5
9	311	314	2.7557		2.1652	5.9055	4.7244	514
Toleranc	ee on 1	I and N	_ 0000	_	0005 on	Pand O	+ 0010 -	.0005.

front hub suggested for standardization were exhibited at the meeting at the D. A. C.

F. W. Gurney, in his discussion of the possibilities of the single standard, stated that he believed a single standard could be worked out which would incorporate many of the dimensions which were approved for roller bearing practice. The difference which would exist between these and the proposed single dimensions would, of course, be concerned with the larger diameter necessary for equal capacities. Some discussion as to differences in fit between the outer cage of the ball and roller bearing was brought forward, but it was pointed out that this was rather a question of tolerance than dimensions, as there was no idea of so manufacturing hubs that interchangeability would exist between the ball and roller bearing hubs; that is, there would be no intention of sending out a hub originally equipped with roller bearings and then changing it to ball bearings after it had been in service, or vice versa. Consequently, tolerances allowed in manufacture would take care of the question of fit.

The economic side of this hub standardization work is of such importance that it forms one of the most interesting pieces of attempted standardization which has come before the automotive industry in years. It is one of the matters which an impartial observer realizes will be of value to all branches of the industry, but at the same time, there are some knotty problems involved in arriving at a standard or recommended practice which will be fair to all. One is reminded of the discussion on tire sizes which was carried on through the S. A. E. for years and finally settled by the War Industries Board during the war. A single act of this board, which had the authority, was able to settle a question which had been one of the moot points in the tire business for years. Many of the discussions which centered around the adoption of the bell housing for automobile engines are also called to mind.

There is no question but that a standard is much needed and if it is going to be possible to arrive at a single standard for both the ball and roller bearings, an almost ideal situation will have been created. If it is impossible, however, it would be far better to have even five ball bearing standards and five roller bearing hub standards for trucks, giving a total of ten, than to continue the sixty or more which are commonly manufactured at the present time.

## What Is the Average Life of Cars and Trucks?

(Continued from page 591)

cially if their annual mileage is not very great and if they are carefully driven. On the other hand, the average low priced car does not last as long, particularly if used in arduous commercial service, as by salesmen, physicians, liverymen, etc. One reason why the average is rather low is that the high-priced cars, which in a general way last longer than the low-priced machines, are greatly in the minority. For instance, suppose that a taxi concern operates two makes of cabs, 10 cabs of one make having an average life of four years and one cab of the highest grade of construction having a life of 12 years. Then the average life of the two makes of cab is

$$\frac{4+12}{2} = 8 \text{ years}$$

but the average life of the 11 cabs is only

$$\frac{(10 \times 4) + 12}{11} = 4.73$$
 years.

It is to this latter figure that the value of 5.31 years for the average active life of all cars corresponds. That is, the short-lived cars are in the majority and they pull down the average in proportion to their numerical strength.

The average life deduced above covers, of course, both passenger cars and commercial vehicles. There is no means of determining the lives of the two classes separately, as in many states no distinction is made in the registrations. As the quality of design and workmanship varies as widely as in passenger cars, there is probably as wide a range in useful life in the one class as in the other.

Since the foregoing computations are based largely upon registration figures, the accuracy of these figures may be questioned. We make no claim of absolute accuracy, but the registration figures we have compiled are probably more representative of the use of automotive vehicles than any other compilation. A statistical company often employed by banking concerns recently

estimated that there are 600,000 cars in use in this country that are not registered. This estimate appears to be too high, even after reading the full report of the investigations upon which this company based its estimate. There is, however, a considerable number of cars in use and not registered. Laws such as those governing the registration of automotive vehicles are easily evaded by persons willing to take the risk and necessary trouble to avoid paying the fees imposed and thus save a few dollars. To offset this, however, there are the cars which are twice registered. The commissioner in charge of registration in New Jersey estimated that 15,000 of the cars registered in that State also are registered in other states. This is true of several of the states which have a heavy summer and winter resort business and in states in which trucks and cars are normally used much in two or more states. These and other features of registration probably balance each other in a sense and leave registration figures the best basis upon which to calculate, even if they are not a strictly accurate guide to the number of cars in actual use in the country.

THE original four-cylinder Stearns tractor engine was made in two sizes, 4\% x 6 in. and 5 x 6 in. Recently a smaller size has been added which can be furnished in three sets of cylinder dimensions, namely, 4 x 6,  $4\frac{1}{4} \times 6$  and  $4\frac{1}{2} \times 6$  in. A total of 51 parts are interchangeable on all five models. The new engine is built much lighter than the earlier model and is furnished with an aluminum crankcase for trucks and light tractors. The valve cover is also of aluminum. Electric starting and lighting equipment is optional with this model, the engine being designed with mountings for the starter and generator. Either three-point or fourpoint suspension can be provided and the size of bell housing is optional. The larger engine is now furnished with a gear drive for the fan and generator, provision being made for mounting a generator by the S. A. E. standard flange mounting. This fan and generator drive goes onto the gear cover of the regular model and is interchangeable with the regular cover.

# Mechanical Features of the Rolls-Royce Chassis

Many refinements embodied to increase convenience or add to durability. Slotted skirt aluminum pistons, constant acceleration cams, vibration damper, adjustable governor, hand primer, dual brake drums, special brake adjusting devices, and rivetless frame are among the unusual features. Hand fitting and careful inspection characterize manufacture.

By P. M. Heldt

HIS article has been prepared after the writer had visited the plant of the Rolls-Royce Co. of America, Inc., and was given an opportunity to study the chassis while the parts are in process of construction and assembly. The chassis has been manufactured in England continuously for the last 17 years, and the

American product is identical to the British, not only in design, but in method of construction. In fact, the duplication is so exact that a well-known American engineer who is thoroughly familiar with American production machinery and methods, when given an opportunity to inspect in detail two chassis, one American and one English built, placed side by side, was unable to detect any difference definitely indicating which was which.

Our purpose is primarily to describe some features of the chassis and details of construction which are different or more elaborate

than usual. Since the chassis is one of the highest priced of any produced either in this country or in Europe, it is natural to expect the use of the highest grades of material and workmanship, as well as elabor-

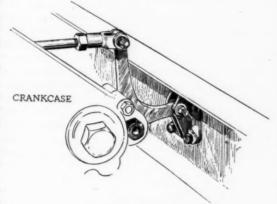
THIS article has been prepared after the writer had visited the plant of the Rolls-Royce Co. of America, Inc., and was given an opportunity to study the and operator, and longer life of the car.

The engine has six cylinders,  $4\frac{1}{2}$  by  $4\frac{3}{4}$  in., cast in two blocks of three, and with a seven-bearing crankshaft of  $2\frac{1}{4}$  in. diameter. The crankshaft is forged

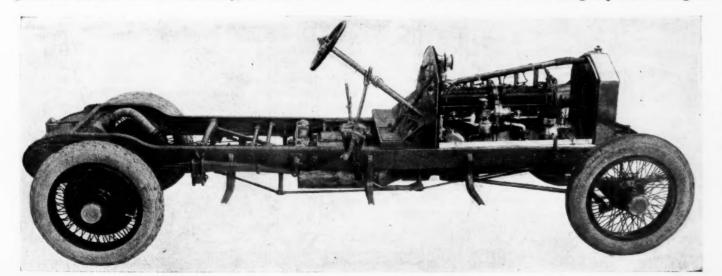
from nickel chrome steel and is finished all over, and the bearings are lapped after being ground, to obtain a smoother surface than is possible to obtain by grinding. The crankshaft is, of course, heattreated, and it is noteworthy that the heat treatment is applied only after most of the surplus stock has been removed, in order to ensure more rapid and uniform cooling on quenching.

The bearing caps in the crankcase are made of nickel steel, heattreated, and are held in place by means of bolts, rather than studs screwed into the aluminum. For boring out the main bearings in

boring out the main bearings in the crankcase, dummy aluminum caps are made use of. The steel caps are ground. The bronze-back, babbitlined bushings are ground on the outside and are fitted into the crankcase and the bearing cap with bluing to



Front engine bracket



The Rolls-Royce chassis

insure a perfect seat, so that the joint will stand an oil pressure of 20 lb. per sq. in. Solid bronze liners are placed between the two halves of the bearing, white metalled on the side toward the shaft. Adjustment for wear of the bearings is made by filing down the liners

The engine is supported on the frame by a flexible four-point support on which the Rolls-Royce firm holds a patent. The forward end of the crankcase rests on two bell cranks, one arm of each of which is connected to a frame bracket and the other two arms of which are connected by a tie rod (see sketch). The fulcrum of the bell cranks is on the crankcase. This construction protects the crankcase against stresses due to frame distortion.

Aluminum alloy pistons are used. Trouble from slap and seizing is prevented by slitting the skirt longitudinally on the pressure sides at a slight angle, and circumferentially at the bottom of the ring belt. The four piston rings have an unusual section, being 3/32 in. wide and .137 in. deep. This gives a very large wearing surface at the sides of the ring and evidently is intended to obviate the trouble of rapid wear of the ring grooves sometimes experienced with aluminum pistons. The rings, moreover, are "pinned" so they cannot creep in their grooves, the pins consisting of bolts through the piston wall, with nuts on the inside of the piston, the threaded portion of the bolt being split and spread apart to prevent the nut coming loose.

The cylinders are ground, but in order to obtain a better surface than can be obtained by grinding the cylinders are lapped in with a dummy piston. The valves are made of chrome (rustless) steel and the valve springs of chrome-vanadium steel. Rolls-Royce use the constant acceleration cam which has a concave flank, and in order to grind these cams (which requires the use of a grinding wheel of very small diameter) they had to develop their own grinding machine. Rocker levers carrying the cam rollers are interposed between the cams and the push rods to prevent side thrust on

the pushrods. The rocker levers are pivoted on plates bolted to the side of the crankcase and are made from nickel steel, machined all over and hardened. The cam roller is mounted in a yoke on the lever. The roller pin is hollow and has a lug formed on it which fits into a slot on the lever, so that the pin cannot turn. A rivet through the pin fixes it endwise. Unlike the great majority of present-day engines the Rolls-Royce does not have the valve springs and adjusting mechanism inclosed, evidently because inclosure would interfere with adjustment of the valve clearance. Noiseless operation of the valves has been insured by making the valve parts as light as possible and by carefully shaping contour of the cam.

The engine is fitted with a vibration damper designed to eliminate torsional vibration of the crankshaft. This is in the form of a friction-retained flywheel at the forward end of the crankshaft. In addition, the timing gear pinion is mounted on the crankshaft in such a way that driving force is transmitted to it through coiled springs. There are eight of these springs, located between four integral keys in the bore of the pinion and four similar keys on the outside of the driving member. A frictional vibration dampener is also provided to prevent the pinion from oscillating rapidly between the springs. This timing gear drive is claimed to reduce noise and wear throughout the engine.

Connecting-rods are machined all over and are held to very close weight limits. The connecting-rod bolts are made hollow for lightness and are made with an integral lug which fits into a recess in the rod to prevent the bolt from turning. Oil is supplied to the floating bronze bushing at the upper end of the rod through a small tube extending up the shank of the rod.

A carbureter of Rolls-Royce design is fitted. This is of the double-nozzle type and has a piston type of throttle-valve. At idling and low speeds only one nozzle is operative. An automatic air valve is fitted which not only controls the amount of air admitted to the car-

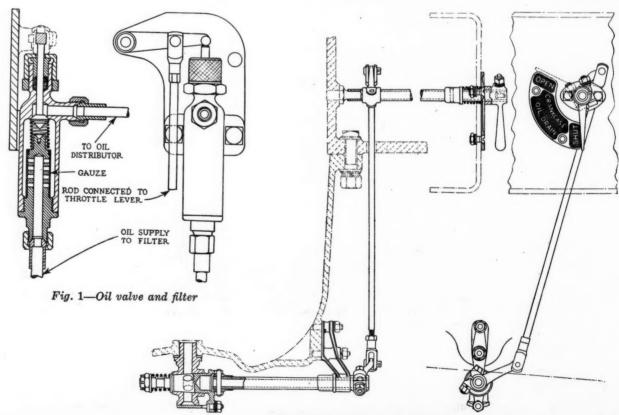
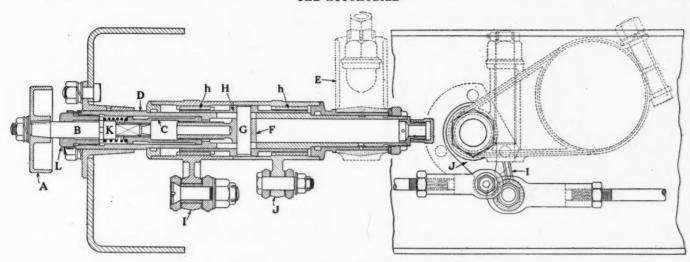


Fig. 2-Oil cock and actuating arrangement



Arrangement of foot brake adjusting device

bureter, but also the vacuum, and, therefore, the cuttingin point of the high speed nozzle. Both nozzles are provided with needle valve adjustment, these valves being controllable (through a small range) from the driver's seat. The air entering the carbureter around the high speed nozzle is drawn through a heater.

The oil pump is of the gear type and has the pressure relief valve formed integral with it. It is driven through a square tube which opens up in case the pump becomes jammed by foreign matter, thus forming a safety link in the drive. The water pump, of the usual centrifugal type, has the peculiarity that water enters the casing from both sides, so that all end thrust is eliminated. It is driven through a universal joint somewhat similar in form to a Hookham joint, the central member being a fiber block. Fuel feed is by air pressure, and the air pump for this purpose is mounted on the governor casing and driven from the governor shaft. This pump is so designed that the pressure is automatically limited to 2-lb. p. sq. in., so that no relief valve is required. Such relief valves are said to be a frequent cause of air leaks.

A governor on passenger car engines is a rarity, but the Rolls-Royce is fitted with one. It acts on the throttle valve and is under the control of a lever on the steering column. When the accelerator pedal is depressed the action of the governor ceases. The advantages claimed for the use of a governor are as follows: In coasting down hill, if the governor is set to say 10 m.p.h., it will hold the throttle closed as long as the car exceeds this speed, and thus save fuel. When driving in traffic the engine can be allowed to idle at a very low speed, for the governor will open the throttle immediately the clutch is engaged and keep the engine from stalling. In gear changing, especially changing down, the governor is useful in getting the speed at which the engine should run when the clutch is disengaged.

The fan consists of sheet aluminum blades bolted to a steel center.

Engine lubrication is entirely by force feed, the pressure being maintained between 3 and 20 lb. Under normal conditions the cylinders are oiled by the spray from the crankshaft, but when the throttle is more than two-thirds opened by the accelerator pedal, an oil valve controlling a direct feed from the pressure system to the cylinders (Fig. 1) is automatically opened by the accelerator, and the cylinders then receive an extra supply of oil. There is a filter within this valve, which prevents foreign matter from getting to the cylinders. An oil level cock in the oil sump is operated by a lever on the left side of the frame (Fig. 2). This cock is fitted

with a cover which prevents dirt from entering and stopping up the tap, and this cover is connected to and moves with the tap. A reserve oil tank, with a capacity of 15/8 gal., is secured to the left side of the frame, and oil can be transferred from this tank into the crankcase by opening the cock at the bottom of the tank. In cold weather, if the oil is very viscous, pressure can be applied to force it from the tank to the crankcase by connecting a tire pump to the top of the tank. The oil pipes are of copper and the fittings are brazed, making a very secure ich.

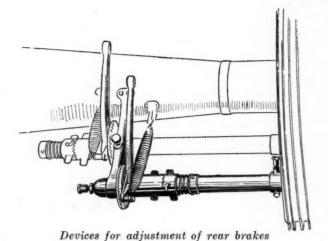
Two entirely separate systems of ignition are provided, one a Watford high tension magneto and the other a battery system made by the Rolls-Royce firm. Both are controlled by a compound switch located at the base of the steering column and operated by a knurled nut at the center of the steering wheel. There are four positions to this switch, namely, magneto alone, battery system alone, both together and all off. In circuit with the coil of the battery system is a ballast coil which tends to keep down the current flow at low engine speeds and also prevents injury to the coil in case the engine should stall and the operator forget to open the switch.

To eliminate chatter in the magneto drive, a small spring-loaded brake is provided, which clasps a ground drum on the magneto, thus introducing a slight countertorque. This makes the drive silent and reduces wear of the universal joints.

The radiator is of the true cellular type and has nickel silver (German silver) top tank and side plates. It is supported by two ball joints on a cross member of the frame and stayed by a bowed steel strip from the top to the engine. The engine bonnet is of aluminum and is provided with a double hinge at each joint.

In order to facilitate starting and reduce the drain on the battery in cold weather, an engine primer is fitted. A U-tube is connected to the bottom of the carbureter float chamber and fills with gasoline from the float chamber through a check valve, to the level of the gasoline in the float chamber. One side of this U-tube is connected to a hand air pump on the dash and the other to a spraying nozzle in the inlet manifold. The air pump is given a few strokes, whereby a measured quantity of gasoline, together with a certain amount of air, is injected into the inlet manifold through the nozzle, the fuel being thoroughly sprayed and intermingled with the air. Although an electric starter is fitted, a hand starting crank is permanently fixed in place, being held by a leather socket.

The flywheel is secured to the flange on the crankshaft

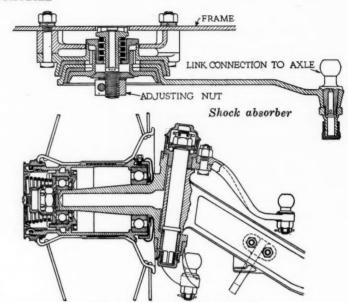


by means of tapered bolts and rivets fitted into tapered holes. The clutch is of the reversed cone type and has a lining of friction material which is secured to the clutch cone by means of staples, said to make a much more secure fastening than rivets. Provisions are made for lubricating the clutch pilot bearing from the engine lubricating systems. The center hole through the crankshaft extends through the clutch pilot and at the end of the pilot there is a valve, which is automatically opened when the clutch is thrown out, remaining open as long as the clutch is out. In order that too much oil may not get through to the clutch pilot during this period, the oil is required to pass through a cotton wad. clutch facing is always steeped in oil. A clutch brake in the form of a spring-controlled fiber pad is provided and presses against a special ring secured to the clutch cone. The position of the fiber pad and the spring lead

can be adjusted. The four-speed transmission is of the selective sliding gear type, and has quite a number of special features. In the first place, the gearcase is cast in a single piece, of aluminum, and has a three-point support upon the frame. Helical constant mesh gears are used to eliminate noise. The first drive shaft, carrying the constant mesh pinion and the direct drive clutch, is mounted between two large ball bearings. The second secondary shaft is mounted on three ball bearings, giving a very rigid support to same and tending toward silent operation of the gears. The driving shaft is also supported in three bearings, a plain pilot bearing in the end of the first mentioned shaft, and two ball bearings, one of which is in the partition wall in the case, which also carries the central bearing of the secondary shaft. The transmission is lubricated with oil of the same viscosity as a good grade of steam cylinder oil and proper provision is made for preventing leakage of oil from the

The rear axle is a full floating design, with a housing built up of forgings comprising large diameter flared tubes. The parts are assembled by means of a large number of square-headed bolts. The final drive is by helical bevel gear, with a reduction ratio of  $3\frac{1}{4}$  to 1. The differential gear is of the spur type, and the side gears are forged integral with the axle shafts. Lubrication of the axle is by oil of the same viscosity as that used in the transmission, provision having been made for retaining it in the axle housing. The bevel gear as well as the pinion can be adjusted to secure a proper mesh.

Thrust and torque reaction are taken on a torque tube with a spherical joint at the forward end. In order to locate the two bearings on the bevel pinion shaft as



Section of front hub and steering knuckle

far apart as possible, and thus reduce the lead on the bearing directly back of the pinion, the torque tube is made in two parts joined end to end, and one bearing on the pinion shaft is placed near this joint. The propeller shaft itself is also made in two parts, with a universal joint of the spur and internal gear type between them.

The propeller shaft universal joint is of the ring type. The ring is made in the form of two half rings, and in order to relieve the clamping belts of shearing strains, the surfaces of the joint are serrated. The pins of the joint are tapered and are fitted with hardened steel sleeves which bear in bronze bushes fitted into the ring. Oil lubrication is used for the universal joint, the pins being drilled out so that centrifugal force will carry the oil to the bearing surfaces.

An important feature in connection with the universal joint is the large hollow steel sphere in which it is inclosed. This is made of two drop forgings bolted together, the whole being bolted rigidly to the frame. On the outside of this steel ball is a large spherical bronze socket which forms the front end of the torque tube. Both ball and socket are ground to a close limit of accuracy.

Both sets of brakes act directly on the rear wheels, but there is a separate drum for each, the drums being made of hydraulic forgings. The inner brake is the hand or emergency brake and the shoes are fitted with cast iron liners, while the foot or service brake is the outer one and is lined with Ferodo brake lining. The foot brakes are unusually large, the drums being 17.1 in. in diameter. These drums are provided with cooling flanges ¾ in. deep, cut from the solid, and it is stated that this brake can be applied for long periods without overheating.

All brackets and levers of the brake mechanism are made of drop forged steel, heat-treated. Both sets of brakes are provided with brake equalizers of the differential gear type, neatly inclosed in aluminum housings mounted on cross tubes on the frame.

The foot brake adjustment is, perhaps, the handiest device of the kind ever put on a car (though by no means the simplest) and is covered by a patent. All the operator has to do to adjust the brake is to turn a small handwheel at the side of the frame, the adjustment being self-locking. A sectional view of this mechanism is shown herewith. The handwheel A has the end of its stem B squared to engage with the cap nut C supported

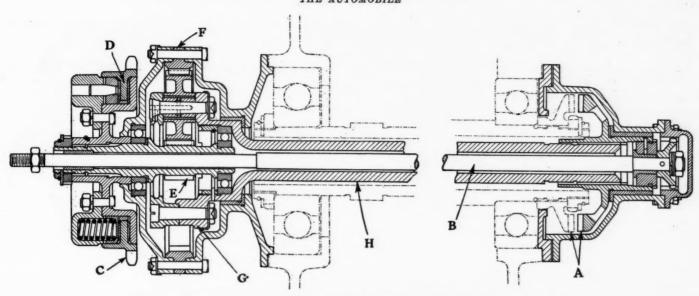


Fig. 3-Arrangement of epicyclic starter gear on secondary transmission shaft

in the tubular member D, which extends between the frame side bar and a bracket E fixed to a tubular cross member of the frame. When nut C is turned by means of handwheel A it draws screw F toward the frame side member. This screw is held from rotating by a pin G extending through slots in tubular member D parallel to the axis thereof, and the ends of the pin extend into holes in the tubular sliding member H, which has steep pitch screw threads of opposite hand cut on it at its opposite ends (h,h). These screw threads engage with similar female threads in the hubs of lever arms I and J, one of which connects to the brake pedal and the other to the brake shaft at the rear axle. Thus when handwheel is turned, tubular sliding member H is pulled through the hubs of levers I and J, causing these levers to turn through slight angles in opposite directions, thereby effecting the adjustment. Ratchet K, which slides along the squared portion of the stem of handwheel A and engages with a corresponding ratchet on the end of hub L, under the pressure of spring M, locks

In addition to this adjustment there are adjustments at the rear axle for both the service and emergency brakes. These, too, are of a very handy type and are illustrated by the sketch herewith. The hub of the lever on the rear brake shaft is made of large diameter and provided with serrations on one side which engage with similar serrations on a dummy hub fast on the shaft. A nut on the shaft screws the two hubs together, thus holding the two serrated surfaces in engagement. The nut itself is provided with coarse radial serrations on its outer face with which engages a sliding locking collar mounted on a key on the shaft. This collar is pressed in the direction of the nut by a coiled spring. When it is desired to make an adjustment, the locking collar is forced away from the nut against the light spring, and slightly twisted around so it will be held in the disengaged position by a pin fastened in the shaft, which extends through a slot in the collar running axially to allow of the motion and circumferentially to effect the locking.

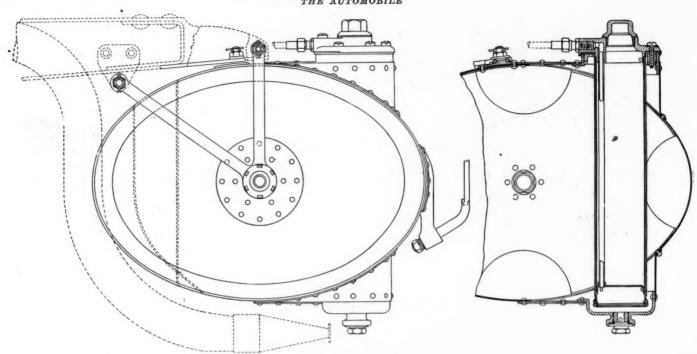
Wire wheels are used, and though these are made by the Dunlop company, they embody Rolls-Royce inner and outer hubs. A serrated drive is used, embodying a large number of teeth and large driving surfaces, with conical supports for both ends of the wheel hub to prevent wobbling. The retaining nuts are positively locked and cannot back off while running. Both hubs are made of pressed steel and are turned down to very light sections.

The mud pan is made of aluminum and is provided with louvres so as to increase the circulation of air through the radiator and prevent the heat and gases from the engine getting into the driver's compartment. This pan extends the whole length of the engine and transmission.

Steering is by a screw and nut mechanism, the nut being split in halves lengthwise, to permit of fitting it accurately to the screw and of making adjustment for wear when required. The nut operates a rocking lever to which the steering arm is secured. This rocking lever is mounted on ball bearings and the steering arm is secured to the rocking lever by means of tapering serrated hubs, these serrations being formed by a process worked out in the Rolls-Royce plant. A feature of the steering gear is that the bearings supporting the worm shaft are located very far apart, whereby the load on the bearing close to the worm is reduced. The ball journal and thrust bearing are located halfway up the column. The control levers are pivoted on brackets brazed to the operating tubes. These brackets can be rotated by disengaging the lever from serrations on the quadrant, as the lever fits into a slot in the bracket. A small spring and plunger keep the lever in contact with the serrations. The control linkage is very carefully made, yoked fittings being used almost exclusively, and when a car passes inspection there is absolutely no play in these connections. Leather boots are fitted to the ends of both the drag link and the steering tie rod.

Front springs are half elliptic and are flat under load. They have solid forged eyes on the master leaves. Shock absorbers of Rdlls-Royce design are fitted at the front of the chassis. These are of the friction disk type, two leather conical shaped cuts fitting between conical steel disks. A spring, readily adjustable for pressure, forces the disks into contact. The rear springs are of the flat cantilever type, and as they have numerous leaves the friction between leaves is sufficient for damping the spring action, hence no shock absorbers are used at the

The front axle is an alloy steel forging, and the steering knuckles are of the inverted Elliott type, with the pivot axes inclined so as to meet the ground at the center point of tire contact. The steering arms are fixed to the knuckles in a very secure manner. A flange is forged on the steering arm, which abutts a similar flange on the top of the steering knuckle, and the two flanges are bolted



Gasoline tank

together. Steering arm forgings are finished by filing all over and are then examined microscopically for flaws. This method of finishing up parts is used throughout.

The generator, which is of the Lucas make, is driven from the front of the gear box by a leather link V belt. The belt tension can be adjusted by means of a nut located on the outside of the frame. Voltage control is by the third brush system. A pressure of 12 volts is employed and the wiring is on the insulated return principle, except, of course, as regards the ignition wiring. The switch box, located on the instrument board, contains the battery cut-out switch, lamp switches, generator field fuses, charging switch, terminals for the generator, battery and lamp connections and a socket for an inspection lamp. A junction box is fitted to the front of the dash on the right-hand side. The cables leading from this junction box are inclosed in aluminum conduits or troughs bolted to the front side of the dash. These troughs are easily removed for inspection and give a neat appearance to the wiring.

The starter is located on the left-hand side of the gearbox and drives to the secondary shaft of the gearbox through a jaw clutch. A planetary gear on the starter, together with another on the gearbox, connected by a chain drive, give a total reduction from the starter armature to the crankshaft of 23 to 1. The sprocket wheel at the transmission is provided with a friction coupling to protect the starter and its gearing in the event of a backfire. A sectional view of the starter drive mechanism located on the transmission is shown in Fig. The jaw clutch A is engaged automatically by an electro-magnet energized when the starter button is depressed. The operating motion is transmitted to the clutch through the rod B extending through the hollow secondary shaft of the gearbox. Referring to the drawing of the starter drive, power is received from the starter by the sprocket C, is transmitted through the friction coupling D to the central pinion E of the planetary set. The ring gear F of this set is held stationary and the power is taken by the planetary spider G, a part of which is forged integral with the hollow shaft H passing through the gear box secondary shaft. This planetary gear gives a reduction of 6 to 1.

All exhaust fittings are either riveted or acetylenewelded. The exhaust gases, before entering the muffler, are passed through an expansion chamber. Both the expansion chamber and the muffler are lagged with asbestos covered with a steel sheath to prevent heating of the body. An exhaust cut-out is provided.

The gasoline tank, of 21 gal. capacity, is made from tinned sheet steel. All joints are lapped, soldered and riveted. There are several baffle plates which stiffen the the tank. All tanks are tested under hydraulic pressure. As the gasoline enters the tank it is filtered through a monel metal screen of very large area, and on leaving the tank it passes through another monel metal screen. The tank is suspended by hangers from the frame passing over the ends of a tube extending centrally through the tank lengthwise, and is held from rotating by a stay from the rear cross member of the frame to the filler fitting.

The frame side members have a section 6 in. deep and are strengthened by an under-running truss. They are made of nickel steel. All cross members are of tubular form, made from seamless nickel steel tubing and are secured to the side members by drop forged fittings pinned and brazed. No rivets are used in the frame, all parts being secured to it by taper bolts passing through taper reamed holes.

NEW parallel attachment for drawing boards, which does away with the use of the T square, has been placed on the market by the New York Blue Print Paper Co. It is claimed to be more convenient than the T square and also to give better results. The metal parts of the Precise parallel attachment are of aluminum and the whole attachment weighs under 2 oz. These parts comprise one plate with double pulley, one plate with two small pulleys at the ends of the straight edge, four brackets with a hole in each, a small grip to hold the cord firmly and sufficient silk cord for operating. The double pulley acts as a T square head, being provided with a shoulder for the purpose. The cords, running parallel, are hidden in the straight edge. The straight edge can be quickly adjusted to any angle desired and can, it is claimed, then be depended on for parallel line work.

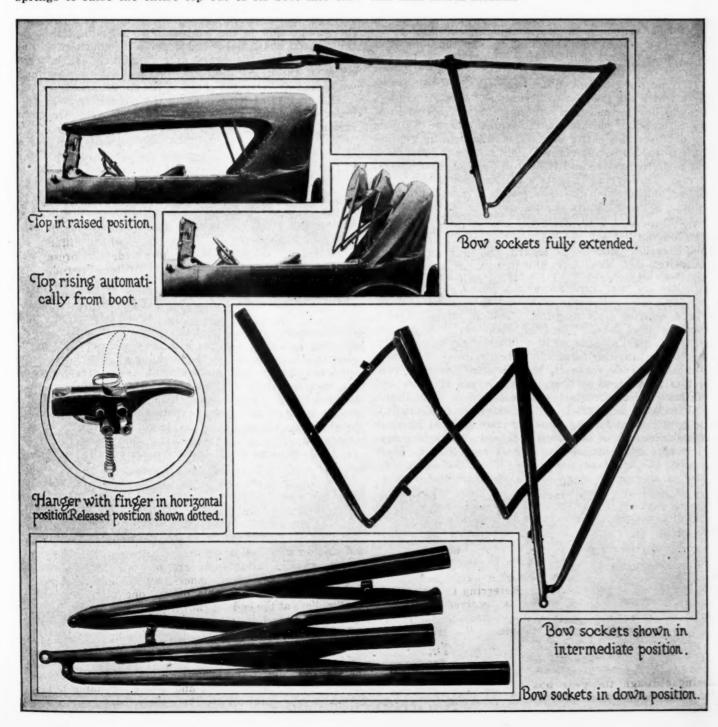
## Seasonable Announcement of Spring Top

A N automobile top which rises automatically as soon as a button is pulled to release a spring is manufactured by the Automotop Corporation. The bow sockets of the top are of the same form and bear the same relation to each other as in the ordinary top. Springs located between the body and the upholstery impart to the bow sockets the necessary motive power. Concealed hangers located inside the car are invisible from the outside of the car at all times. A pull button, situated at any convenient part of the car, releases the bow sockets from their hangers. This pull button is connected to the hanger finger releases by coppered steel wires. When thus released the spring actuated fingers throw themselves clear of the bows, permitting the springs to raise the entire top out of its boot into the

final position of the main bows. From this point of operation the linkages connecting all of the bows come into play through the weight of the bows and top fabric, causing the entire top to assume its final horizontal position. It is then only necessary to pull down the snap locks fastening the forward bow to the windshield posts. A fabric side curtain pocket extending across the forward bow when the top is up covers the nest of bows, fabric and hangers when the top is down.

To take down the top, the windshield fasteners are released and by a light pressure of the hand on the forward bow, the entire top is pushed back into the boot and the hanger fingers snapped over the bow sockets. The top can be put up almost instantly, and taking it down requires

less than fifteen seconds.



# Refinements in a Battery Ignition System

Novel features claimed include a straight line contact with one floating point which prevents pitting. Duplex system differs from other systems in that either high frequency spark or single spark can be used as desired.

By J. Edward Schipper

HE Philbrin battery ignition system, which has been on the market for a number of years, has been refined in several details and brought up-to-date. The system was exhibited at both the New York and Chicago shows and is being offered for all lines of automotive work.

It is an open circuit system incorporating some features which are claimed to be unique. These include a straight line instead of a swinging contact movement of the interrupter movable part, said to insure uniform contact over the entire surface, and a floating contact shaft in the adjusting screw. This is free to move back and forth or revolve and is held in position by a helical spring. This spring imparts a turning movement to the contact shaft, which prevents pitting and mating of the points. A third feature claimed as an advantage is that the circuit is closed gradually and at the point of maximum saturation is broken instantly by the contact plunger dropping abruptly off the end of the cam tooth.

Probably the feature of greatest interest is the condenser, which is made up of sheets of aluminum foil with one layer of hard and one layer of soft paper in between. The condenser is wound in cylindrical form over a quarter inch mandrel. This is slipped into a seamless steel tube. The tube with this filler is then put into a steel die, placed in a punch press and pressed into the rectangular form. By this means, it is claimed, a substantial decrease in the distance between conductors is obtained by bringing the layers of paper and foil into intimate contact with each other. The leads, 3/32 in. wide and .003 in. thick, extend across the full width of the conducting plate, and are secured in place with shellac. Over each lead is placed a protecting covering of varnished paper, which is also held in place

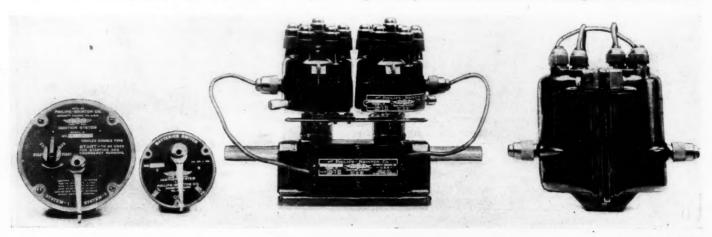
with shellac. It is an objection to the use of aluminum foil for condensers that it is difficult to make a satisfactory connection to the leads, but it is claimed that by the method above described a perfect connection is obtained between the brass and aluminum, as the raw edges of the brass strip are forced into the aluminum while transforming the shape of the condenser in the die.

The process of impregnating the condenser is as follows: The leads are connected in a 220-volt circuit in series with a lamp which is before the operator. The

The Philbrin single-spark interrupter

condenser is then placed in a bath of wax, the temperature of which is approximately 280 deg. Fahr. In the course of 10 sec., bubbles are seen coming from the ends of the condenser. Owing to the high temperature of the wax, moisture between the folds of the condenser and in the paper is converted into steam. This

steam acts as a conductor of the current. In about 15 sec. the lamp (which is in series with the condenser) is seen to glow faintly. Meanwhile, the bubbling at either end of the condenser has become quite violent, as the steam, escaping from the condenser, tends to cause a partial vacuum; thereby drawing in the wax which takes the place of the moisture that has been expelled. The light glows brightly up to the point of maximum conductivity of the steam saturated condenser. After that point the light gradually dims as the dielectic strength of the condenser



Parts of Philbrin ignition systems

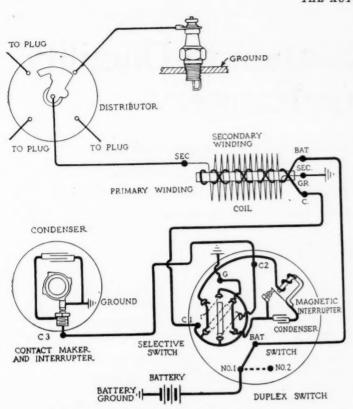


Diagram showing principle of operation and internal winding of Philbrin duplex ignition system

builds up due to the absorption of the impregnating wax until the light goes out entirely. The condenser is then left in this bath about 25 min. so as to insure thorough impregnation, the current being kept on throughout the whole period. Previously, it was necessary to dry the paper carefully before using, but in this process the moisture in the paper is utilized to help impregnate the condenser.

The coil is of the non-vibrating, open core type. The primary winding consists of two layers of wire wound around an iron wire core. This primary is secured in a laminated tube having 1/16 in. thickness of wall and composed of layers of "Kraft" paper and varnished paper.

The secondary, which is made in two sections, is mounted on the outside of this tube. Two and one-quarter turns of varnished paper are used for the insulation between the layers of the secondary winding. The coil is embedded in a bakelite case, which makes it oil and moisture proof.

The Philbrin duplex system differs from other ignition systems in that it uses either the single spark or the high frequency spark. These combined systems employ the same coil and distributor and are controlled by a common switch. In this switch is located a magnetic interrupter or high speed vibrator. This vibrator produces from 50,000 to 60,000 sparks per min. For some classes of work a frequency in excess of 100,000 is used. This switch is provided with a selective switch button which selects the system desired, either the single spark or the high frequency.

When the single spark system is being used, the timing is done by breaking the primary circuit. When the button is in the high frequency position, the magnetic interrupter in the switch is operating continuously. The timing and distributing is done by means of a distributor blade with a trailing tail, and the action is as follows: When the forward edge of the blade is approximately

.015 in. from the distributor pin, the spark jumps to that point and the sparks are distributed to that cylinder throughout the power stroke. As the tail of the blade leaves this pin the sparks continue to jump back to the pin, since the cylinder connected is under a lower compression than that connected to the pin which the forward edge of the blade is there approaching, until the forward edge of the blade is within approximately .015 in. of this distributor pin, when ionization of the air takes place and the spark jumps to this distributor pin and repeats the same cycle of operations.

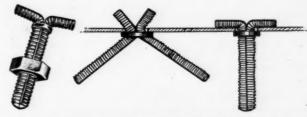
These sparks are synchronized, as no commutator is employed in the primary circuit, but the circuit is closed through the magnetic interrupter as long as the switch is in this position. Each time the high frequency system is turned on, the polarity is automatically reversed, as the button is turnable only in a clockwise direction. This system is used for starting a cold motor and for emergency running, as when excessive oil conditions are encountered, or when a poor carbureter adjustment is used. It is not possible to have both the single spark and the high frequency turned on at the same time.

The single spark double system is used where it is desired to produce two synchronized sparks in the cylinder of an engine. Two distributors and two contact makers are then employed, only one of the contact makers being used at a time, the other being held in reserve. With this system, no high frequency spark is employed.

The duplex double system is used where it is desired to produce two synchronized sparks in the cylinder of an engine. This is done by employing one contact maker and two distributors mounted on a common base. Two coils are employed with their primaries wired in series. This produces two independent secondary sparks, each going to its own distributor. The high frequency system operates the same as before described.

The triplex double system is used where it is desired to produce two synchronized sparks in the cylinder of an engine. The only difference between this system and the duplex double system is that two contact makers are provided, but only one is used at a time, the other being held in reserve. This system was developed at the request of the Baldwin Locomotive Works three and one-half years ago. It is claimed that it made the use of large locomotives practical and that other methods had utterly failed on these locomotives.

A SPLIT bolt which can be secured into the panels of sheet metal bodies is manufactured by the Savage Expansion Bolt Corp. It may be described as a length of screw-threaded rod split lengthwise through the center, each half having one end turned at right angles. To fasten the bolt into a sheet metal panel which is accessible from the outside only, a round hole the size of the bolt is made in the panel, the halves of the bolt are then put with their turned head portions together and the bolt is forced through the hole, after which the nut is drawn up tight, anchoring the bolt firmly in the panel. If it is desired to secure a sheet metal or similar bracket to the panel, this can, of course, be put under the nut.



A split bolt for use in sheet metal body panels

# Hardness and Its Relation to Ductility and Fatigue Range

The meaning of the term hardness is clearly explained, and various methods of measuring this quality are discussed. The relation of hardness to ductility and fatigue range is pointed out and the tendency to demand high ductility at the expense of other desirable qualities is discussed.

By Dr. Walter Rosenhain, F.R.S.

THERE are probably few properties of metals which are of more general importance to the engineer than "hardness." This is a property, or more probably a group of properties, which it is extremely difficult to define and which it is correspondingly difficult to measure, but the term none the less corresponds very definitely to something which, in engineering materials, and particularly in such structures and machines as are involved in automobile engineering, is extremely necessary. It is, therefore, worth while to devote a little consideration to what we really mean by the term "hardness" and how we can define and measure it in the first place and how it is to be best obtained and utilized afterwards.

The general conception of "hardness" is perhaps best understood if we think of it as the opposite to "softness." Now softness is the typical quality of a material which is easily displaced. If we can push a finger into a piece of clay or wax, we speak of it as "soft." Hardness, therefore, as the opposite of "softness" we may fairly regard as the power of resisting displacement or "pushing away." But here we meet the real difficulty—that materials can be "pushed away" in a variety of different ways. The pushing away may be done by direct pressure or thrust, as when an indentation or punch-mark is made, or it may be done by lateral pushing or shear, as occurs in some forms of cutting or scratching, or-finally-it may be done a little piece at a time, by abrasion or wear. Yet we term the power of resisting all these different kinds of displacement "hardness" and try to measure this property by measuring the resistance of the metal to one or other of these various forms of displacement.

That "hardness" measured in one of these ways does not necessarily measure the power of resisting the others becomes quite plain if we think of one or two special cases. Thus suppose that a material or body were built up out of a regular pile of small, strong flat plates placed one upon the other. Indentation of such a pile by vertical pressure upon its upper surface would meet with very great resistance, and the apparent "hardness" would be very great. Yet the little flat plates could be pushed away along the surface with great ease, and hardness measured as resistance to that kind of displacement would appear very low indeed. Again, whole layers of the little plates could be pushed along with comparative ease if a lateral or shearing force were applied, and again the "hardness" would be low. Although this is an extreme case, and real metals are not built up in such a peculiar manner, yet it serves to illustrate the point that we cannot, as a matter of course, assume that a body having a high hardness number as measured by indentation methods, must also have high resistance to scratching or abrasion. In actual materials there is, fortunately, some linking up of properties. As a rule, for instance, high tensile or compressive resistance is accompanied by high resistance to shear also, and this generally implies a high degree of resistance to local shearing or abrasion.

There are, however, important exceptions to this latter rule. All ordinary tests are made fairly rapidly and can therefore ascertain only the properties of the material as it exists at the moment of test. Yet there are some materials which undergo very profound changes of internal constitution and structure if exposed to certain special working conditions. This applies, for example, to a certain group of special alloy steels which contain enough of the added elements, such as nickel or manganese, to keep them in what is known as the "Austenitic" condition, in which they are relatively soft and non-magnetic. Some of these steels, if subjected to mechanical deformation involving plastic strain, become converted into what is known as the "martensitic" state, in which they are very "hard" and magnetic. Tested in the ordinary way, such a steel appears to be comparatively "soft." Yet the wearing surface of a rail made of such a steel becomes converted, under the stresses to which it is locally exposed, into the hardened form of the steel and resists wear to a most surprising extent. From the point of view of hardness-testing, materials which behave in such a manner are fortunately rare, but for many purposes they are extremely and increasingly important.

The usual methods of hardness-testing rely upon the assumption that resistance to one method of displacement implies a corresponding degree of resistance to all other methods of displacement. Since in many materials there is an approach to compliance with this assumption this is a useful process, but it is important to bear in mind that it is based on such an assumption which may, and sometimes does, break down seriously here and there.

The most widely used of all hardness tests, particularly in England, is the Brinell ball indentation tests. This test is so well known that it is not necessary to take up space by any detailed account of it, and we need only consider it from a very general point of view. What it measures is something which depends upon the general "strength" of the metal; in most cases the "Brinell Number" is directly proportional to tensile strength. This, no doubt, is an advantage where it is desired to save the trouble of making a tensile test if a simpler test like the ball-test will serve the purpose, but from the point of view of actual hardness-testing it is less satisfactory, since it becomes clear that the ball-test shows little or nothing that is not already known from the well-explored tensile test. None the less, the real utility of the ball-test cannot be

doubted, particularly since it allows of the rapid exploration of relatively large surfaces of metal with a view to ascertaining the uniformity of the material. The test can be applied without seriously damaging many objects, and for the purpose of ascertaining whether a given material has been correctly made or treated so as to attain a given degree of "hardness," it leaves little to be desired except in the case of extremely hard metals, such as fully hardened steel. There, the deformation of the ball becomes serious as compared with that of the material under test and the resulting figures are apt to have very little value. Apart from that difficulty, however, uniformity of ball-hardness is a very good guarantee, throughout successive productions of the same kind, of uniformity of composition and treatment. On the other hand, comparison of the "hardness" of widely different materials in terms of the ball-test is a much less reliable proceeding.

The Brinell or ball-indentation test has the further rather serious disadvantage that the "hardness number." which is generally found by dividing the load applied by the total area of the spherical indentation produced, is not entirely independent of either the size of the ball or the load employed. It does not, therefore, represent as it is intended to do, the load per unit area which the metal under test is capable of supporting without further deformation. Attempts have been made in two directions to improve upon the ball-test by making the indentations in a slightly different way. In one, usually known as the Ludwik Cone Test, the indentation is made by pressing into the metal under test a steel cone having a sharp point. All indentations made with such a cone are geometrically similar and there is no need to use different cones with metals of widely different "hardness"; the applied load can be varied without destroying the geometrical similarity of the indentations. This method gives excellent results until the attempt is made to apply it to very hard materials—then the point of the cone, and with it the test, are liable to break down, as the local stresses become excessive.

In another direction the attempt has been made to replace the hardened steel ball of the Brinell test by a flatended parallel punch. This method also presents important advantages, but it has not yet been studied sufficiently to be capable of general application. In an entirely different direction, however, important modifications of the hardness test have been developed. These developments have taken the direction of making the application of the indenting instrument very brief indeed and thus of producing an indentation by impact rather than by "static" or steady pressure. In England this line has been followed by Prof. Edwards, who was mainly concerned with a problem which is of very direct importance in connection with automobile engineering. This is the determination of the properties of materials at such high temperatures as those to which they are exposed in the interior of an internal combustion engine. Pistons, valves, cylinder heads and even connecting rods all have to do their work at temperatures which are high enough to produce a material change in all the physical properties of our materials. It is, indeed, often found that of two materials the one which is weaker at the ordinary temperature is appreciably the better of the two at, say, 600° Fahr. (250° C). Tests of hardness at various temperatures are, therefore, of very considerable interest and value. There is, however, a difficulty in making such tests in the ordinary way by the ballindentation method, because the exposure of a hardened steel ball to such a temperature as 600° Fahr. for any length of time softens and spoils it to a serious extentand at still higher temperatures, such as come into consideration in connection with exhaust valves, the steel ball becomes useless if left in contact with the heated test-piece for more than the fraction of a second. It is for this pur-

pose that Edwards has developed a ball-impact test, in which the heated test-piece is indented by means of a cold steel ball which strikes the test-piece and rebounds from it before the ball has had time to be affected.

As a general rule, Edwards has found that the ballhardness as found by impact does not vary very much from the "static" hardness in such cases where direct comparison can be made, although a few metals furnish marked exceptions to this parallelism. Curiously enough, iron or very mild steel is one of the most striking exceptions. This case has, however, been fully explained in a manner first anticipated by the writer and subsequently fully verified in his and other laboratories. It is found that the exact manner in which iron, or the "ferrite" of very mild steel, undergoes deformation is different when the stress applied is "static" from that which occurs when the stress is due to a blow or is "impulsive." In the latter case, microscopic examination shows in the vicinity of the indentation a large number of fine lines running across the ferrite crystalsgenerally known as "Neumann's Lines," which are entirely absent near a statically-produced indentation. This discovery, while it explains the discrepancies in impact hardness numbers, is still more important because it shows definitely that what occurs in ferrite under impact is quite different from what occurs under steady loading-a circumstance which lends added importance to the whole question of impact testing.

The method of ball-hardness testing under impact, as developed by Edwards, still relies-both for tests at ordinary and at high temperatures-upon the subsequent measurement of the indentation produced. A somewhat similar impact-hardness test has been developed—at an earlier date-by Shore in quite a different direction. In the wellknown Shore Scleroscope, which originated in America, the impact of the "hammer" also produces an indentation but no measurement of this is included in the test-all that is measured is the height of rebound of the hammer after falling upon the surface to be tested from one standard height. What the height of this rebound really measures is simply the amount of energy left in the hammer after making the indentation. This depends upon how much the metal which has been struck has been displaced or indented and how much energy has been absorbed in this process of indentation. There are also other losses of energy, such as the heat generated at impact and losses by elastic and other displacements of the piece of metal as a whole, but in most cases these are fortunately small enough to be neglected in this type of test. To a certain degree of approximation, therefore, the rebound in the Shore Scleroscope measures the resistance of the metal to indentation under impact, and this is clearly, a particular kind of "hardness." Again, in the majority of materials, this property appears to run nearly, if not quite parallel with ordinary Brinell ball-hardness, and-like the latter-with tensile strength. There can, therefore, be no doubt as to the convenience and value of the Scleroscope test, provided that it is used with care and with an intelligent appreciation of its limitations. In order to realize how serious these limitations may be if the test is applied—for example—to a thin piece of metal not quite adequately supported, it is instructive to make a Scleroscope "hardness" determination on a piece of fairly stout celluloid sheet, first placing this direct on the metal base of the Scleroscope and afterwards interposing a fairly thick piece of india-rubber. In the latter circumstances the rebound is higher than that obtained from the hardest steel. On the other hand, it is only fair to point out that for the testing of very hard materials, the Scleroscope working with a diamond-ended "hammer" has a distinct advantage over other ball-indentation methods. It appears to the writer, however, that while the Scleroscope in its present

form is very simple and easy to use, its value as a testing instrument would be very much increased if it were possible to vary the height of fall of the hammer.

Quite recently, Dr. Haigh, at the Royal Naval College, Greenwich (England), has worked out an entirely different method of hardness testing. Recognizing the difficulty which arises in the case of hard metals from the deformation of the ball or other tool used for making indentations, Haigh has developed a method in which the indenting implement and the indented specimen are made of the same metal and are caused to indent each other in a symmetrical manner. Two square-sectioned bars or prisms of the metal to be tested are prepared of exactly equal dimensions; these are then held securely in jigs and, with their lengths at right-angles to each other, and edge crossing edge, are pressed together with a known load. The two prism-edges indent one another symmetrically, and the amount of this indentation is a measure of the hardness, just as in the Brinell test. This ingenious test is still in its infancy, and suffers from the obvious disadvantage that it can only be applied to specially prepared test-pieces, but it offers some entirely new possibilities in hardness-testing and it may be destined to throw new light on some of the difficult problems connected with this subject.

In addition to the purely mechanical tests of "hardness" which we have just considered, there are a number of others based on such methods as scratching or abrasion which do not appear to be as yet capable of any high degree of precision. So far as abrasion or resistance to wear is concerned, it still seems that actual trial in service is the only really reliable test where the comparison of different materials is concerned. At most, a test-model designed to imitate the conditions of service may be employed for trial purposes, but if the test is to be a quick one, the similarity to service conditions must inevitably be violated and the resulting data to that extent rendered doubtful. It is, therefore, reasonable to state the position in this way, that while ordinary "hardness" tests of the indentation or Scleroscope type furnish a general guide as to the "hardness" of metals even from the point of view of resistance to abrasion, it is not safe to rely too much upon such guidance except in the case of a single class of material in which the correlation between these tests and wear in service has been definitely established. To put the matter in concrete form, the relative degrees of hardening of a set of pieces of the same carbon steel could be safely ascertained by the ball or scleroscope test; but of a bronze and a steel giving identical "hardness numbers," one might give very much longer life in service than the other.

#### Ductibility

Even the general kind of guidance which can thus be obtained from ordinary hardness tests, however, is of immense value in the selection of materials and in deciding upon their treatment. That hardness is of vital importance in engineering construction is, of course, obvious. On the other hand, increased hardness nearly always brings with it a corresponding decrease in ductibility, and the rival claims of these two properties deserve a little consideration. Both the designer, the maker and the user of engineering products have a deep-rooted desire for ductility in their materials. It has, of course, been pointed out that an automobile back-axle which has been seriously bent by an accident is no more serviceable than one which has broken short off, and it is doubtful whether an accident is likely to be rendered less serious by the mere fact that damaged parts have given way by bending rather than breaking. The extreme demand for ductility which still exists in many quarters is probably to a large extent a heritage from the days—now seemingly remote, but really not very far back in history—when wrought iron was the principal

material for all engineering construction. In that material, ductility stood for good quality in all respects and material which "broke off short" was rightly regarded with suspicion. When steel was first substituted for wrought iron, it was natural that the same demands for ductility should be made upon it, and in very mild steel these demands can of course be met. But the demand has extended, to a certain extent, to all other materials, and for many years engineers have thought it essential to sacrifice much to this requirement of ductility.

That there is need for ductility in many places is not, of course, to be denied. The exigencies of constructional operations often require a little "cold setting" of parts, and even where such operations are entirely avoided, the inevitable errors, or rather variations of workmanship still require that the material shall have the power to yield slightly in order to secure a more uniform distribution of load. But for these purposes, as a rule, quite a small degree of ductility is adequate; no adjustments of the kind mentioned demand any such ductility as would correspond, for example, to an elongation of 20 per cent on 2 inches in a tensile test. It would seem, therefore, that the real need for ductility for its own sake under service conditions is quite small. It is, therefore, only as a test for quality of the material that it can be given any very great importance. If that is the case, however, it should be regarded from a point of view rather different from that ordinarily adopted: ductility should only be valued as a quality to be aimed at so long as other and more immediately important qualities are not sacrificed.

#### **Fatigue Range**

Thus, in the majority of the working parts of an engine, it is the fatigue range—i. e., the range of alternating stress to which a piece can be safely subjected for an indefinitely long series of repetitions—which really measures the value of a material. Now this "safe range" under fatigue is associated very closely with the property of "hardness" which we are here considering, and like hardness, it can be obtained, as a rule, only at the expense of ductility. Now consider the case of a crank-shaft. Failure under fatigue is of vital importance; but provided the shaft will stand the small amount of straightening which may be necessary at one stage of its manufacture, of what further use is ductility in a part which would become useless if it were a few hundredths of an inch out of line? Yet the demand for a relatively high degree of ductility in most specifications definitely limits the hardness and with it the safe fatigue range of the material employed. Among materials having the same fatigue range, it would no doubt be justifiable to select that which showed at the same time the highest degree of ductility, although even there the selection should be based rather upon the results of a notched-bar impact test than upon ductility alone. But, given a certain minimum amount of ductility, depending upon the nature of the service required, it appears to be traditional rather than logical to value higher ductility at the expense of hardness and fatigue resistance.

More directly concerned with the subject of hardness is the question of material exposed to actual abrasive wear, such as gear-wheels, shafts running in bearings, etc. Here there are two divergent lines of practice which are of interest in the present connection. They may be described as the "case hardening" and the "all hard" respectively. So far as actual hardness tests are concerned, identical values can be obtained from materials of both kinds, although it is important to remember that in the ball-indentation test there is danger of obtaining much too low a value if the indentation is made in a very thin, hard case lying upon a soft core. With identical hardness numbers one may, in

this case where the materials are otherwise similar in constitution and structure, assume that actual wearing properties as against abrasion will be identical for the "cased" and the "all hard" materials so long as the case is not worn through. Actually, however, it is usually easier to obtain a high hardness number from a cased article than from one which is entirely hard. The reason is that a more severe quenching process can be safely applied to a properly cased article than to one which consists entirely of high-carbon steel. In the latter case the volume changes due to hardening occur throughout a much larger mass and there is a greater tendency to crack. In the cased article, on the other hand, flaking of the case may occur if the transition which occurs between case and core is not sufficiently gradual.

The sort of consideration just mentioned, which governs the degree of hardness attainable, applies also in other directions. Apart from the question of cost, the preference for cased articles to some extent derives its inspiration from the desire for ductility which has been discussed above. While the extreme ductility of a very mild-steel core encased in hardened high-carbon material can hardly ever come into play, there is yet something to be said on the other side. Where "all hard" steel is employed, the article is often so treated as to become fully hardened throughout, and the whole material is thus put into a condition in which there is a total absence of all ductility. This, it would seem, is carrying the doctrine of "hardness at all costs" decidedly too far, since some little degree of ductility is undoubtedly not only useful but even necessary in most engineering objects.

Looking back over the whole subject which we have here passed under review, it is clear that hardness and the other physical properties which appear to be so closely associated with it, are of fundamental value in engineering construction the further study of the methods by which it can be obtained and tested and measured is therefore a field of great importance.

## Government Report of British Aircraft Autumn Trials

THE Air Ministry's report of last year's early autumn trials of British airplanes and land and waterplanes, including both normal and special commercial aircraft types, has recently been issued. The report eulogizes the progress made, especially in commercial type aircraft by way of contrast with those which were adapted for commerce from war machines. A special tribute is paid to British magnetos as fitted to the competing machines. The report says, "When a few mechanical details have been improved," there is little doubt that the British magneto will be the best in the world, and that the British manufacturers of magnetos as shown by this trial will "be ahead of any foreign rivals." The advantages of a fair margin of extra engine power despite the extra cost also are emphasized.

The report, like the trial, while useful technically, does not seem likely to help a revival of civil aircraft building which at the present is almost dead. The Government's decision to grant \$300,000 this year as a conditional subsidy to aircraft builders, promulgated this week, seems to be timed auspiciously for this report, but it is felt that the sum is insufficient for any technical development. As matters stand only the Handley Page Co. seems likely to benefit, since it is the only one qualified to compete for the subsidy. The conditions prescribe that competing companies must be British, and must be able to show that on a maximum of forty-five days in each period of three months flights have been completed in both directions by aircraft of British manufacture, fitted with British made engines, within a fixed maximum period of time allowed for each journey.

The routes at present approved are London to Paris, London to Brussels, and London to Amsterdam. Extensions to these routes and additional routes, such as England to Scandinavia, on which the possibilities of a service employing flying boats or amphibian machines, or a mixed service of sea and land aircraft, can be demonstrated, may be approved.

The sum offered compares poorly with the amount, \$750,000, recommended to be allotted by the Government's Advisory Committee in June last. Moreover, the scope is limited to continental routes. The aircraft industry naturally wants to develop inland air services, in which respect Great Britain compares unfavorably with France and Germany.

The following points are gleaned from a *Times* interview with Mr. Handley Page following the announcement of the Government's grant.

The sum, he considers, is good, having regard to the present financial stringency. It will be useful in developing long distance flights in other countries, such services being of the sort already subsidized by foreign governments. It may lead to reduced charges, since even the present scale of charges is profitable without obtaining full loads. There will follow development all round.

Mr. Handley Page, also, does not ignore the possible danger of a Government subsidy retarding progress because of the tendency to lean on Government support. But he seems more concerned that the help was not forthcoming earlier, as it might have prevented the passing out of certain pioneer aircraft firms. He also thinks that as the grant (at present) is for one year only, it is not likely to develop the betterment of the commercial airplane, because such new machines if put in hand now would not be ready for flying on service next year.

## Lowering Costs by Greater Production

N effort to obtain lower costs by greater production and increased efficiency instead of by lower wage scales is the general program of S. F. Bowser & Co., Inc., manufacturers of oil and gasoline storage systems, Fort Wayne, Ind., and is also the program of other local industries, according to S. B. Bechtel, manager of the Bowser plant. Labor during the year 1920, according to Mr. Bechtel, was unproductive generally and was only about 45 to 55 per cent efficient. Already this year, he declares, there has been an increase locally of 25 per cent in labor's efficiency. Labor alone is not held responsible for this condition by Mr. Bechtel, but industrial management is also declared to have been inefficient to a great extent during the period of war-time high prices and abundance of orders. During 1920 approximately 15 per cent of all local labor was absent on every working day and this has now been reduced to 2 per cent.

# An Elevating Dump Body

Is designed for use primarily for dumping from an elevated position but can be used in same way that ordinary dump body is employed. Is operated by hydraulic hoist and is provided with 18 ft. telescoping chute.

To meet a demand for an elevating dump body embodying a simple operating mechanism, the engineers of the Federal Motor Truck Co. evolved the design herewith illustrated, on which a number of patents have been applied for. This body is intended to be

used primarily for dumping a load from an elevated position, but it may also be used as an ordinary dump body.

This type of body is extensively used in the coal business, in road building (dumping into concrete mixers) and in garbage collection (dumping into a large body). It is composed of three principal units—a dump body, very much like an ordinary body; a hydraulic hoist, and an elevating mechanism under the body. The body has two dumping positions—the elevated position, which raises the lower end of the body 6 ft. above the ground, and the ordinary dumping position.

The dump body is the ordinary type of body with a flat, sliding bagging chute door in the tail gate and carrying an 18-ft. telescoping chute in a cradle under the body. The hoist is the Federal Motor Truck Co.'s standard heavy duty type, except that cross arm at top is secured in a solid instead of a pivoting bracket.

The elevating mechanism comprises a frame extension arranged above the chassis frame, strengthening the frame and carrying the shafts, brackets, etc.; an elevating frame pivoted at the rear and carrying the lifting arm at the front and the main elevating lever at



Body in ordinary dumping position



Body elevated into high dumping position

the center, this frame being elevated just as with the ordinary dump body; a main elevating lever pivoted at the center of elevating frame, the lower end being anchored to the frame by pull rods and the upper end elevating the body; pull rods pivoted at the lower end of the main elevating lever, the lower ends having a cross shaft which is engaged or disengaged by release hooks; a shaft holding two large cast steel hooks is connected by brackets to the frame extension just above the rear axle. On the right end of this shaft, and outside of the frame is a hand lever, which throws the hooks forward to engage the pull rod shaft for the elevating position, or backward to release the pull rods for the ordinary dumping position. The front elevating member, being joined to the body and the main elevating frame, lies almost flat when the body is down, and advances toward an upright position to give sufficient angle for dumping when the body is elevated.

The body is elevated into the dumping (Continued on page 621)

# Proposed Methods of Automotive Gear Inspection

Gear Makers Association developing standard practice for inspection of their product. Size of hole, wear of gages, tapered holes, keyways, tooth bearing, splined shafts and methods of test are some of items considered.

SUB-COMMITTEE of the American Gear Makers Association Standards Committee, of which E. J. Frost is chairman, is developing standard methods for inspecting gears commercially. At the Lake Mohonk meeting of the A. G. M. A. an interesting report was presented on the subject of inspection, but no action was taken on it. The following rules for gear inspection, therefore, are at present only committee recommendations, but it is quite likely that at the next meeting, to be held at Cincinnati in the spring, they will be made recommended practice by the Association.

Inspection of Bores-Cylindrical holes up to 3 in. diameter shall be inspected with "will and will not go" plug gages, the "will go" end to have a diameter the same as the smaller limit and the "will not go" equal to the larger limit given on the customer's drawing.

Tolerance for wear to be allowed before discarding gages:

	TABI	E I	
Size of Hole,			
In.	Class 1	Class 2	Class 3
0 to 1/2	.00007"	.0001"	.00015"
½ to 1	.00010"	.00015"	.00020"
1 to 2	.00015"	.00020"	.00030"
2 to 3	.00020"	.00025"	.00040"

#### **Tapered Holes**

Tapered holes shall be inspected with tapered plug gages and the quality of fit determined by painting the gage with red lead or prussian blue, when a full bearing shall be shown.

.00025"

.00040"

Proper depth of reaming or grinding shall be indicated by a stepped shoulder located at either end of the plug, as the case may require, the height of the step and relationship to the taper agreeing with limits given on customer's drawing.

#### Keyways

Keyways in both straight and tapered holes and for both single and multiple keys shall be inspected for width of keyway by using "will and will not go" bar gages, gaging the width only.

For alignment and depth, a plug gage shall be used, which has body diameter equal to the small limit of the hole and a key long enough to reach the entire length of the keyway, the width and height of the key gage agreeing with the customer's small limit.

If the maximum depth is important, a similar gage shall be used as a "will not go," having a key height equal to the maximum shown on the customer's drawing.

#### Woodruff Keys

A hardened gage similar in shape to a Woodruff key but slightly thinner than standard, shall be used, and a keyseated ring gage slid over it. The latter should

check for depth and alignment and also show if radial. If both minimum and maximum depth are required to be verified, two keyseats can be put in the ring, these agreeing with the two limits on customer's drawing.

For width, use a "will" and "will not go" bar gage, both ends of which shall agree with the customer's

#### **Test Stands**

The smaller sizes of spur, spiral and internal gears, shall be checked for pitch diameter, eccentricity and irregular teeth by inspecting on a hand stand, the essentials of which should be, rigidity in construction so that none of the parts can spring, and one rigid and one freely sliding head, so arranged that the movement of the sliding head will actuate a dial indicator.

The studs on which the work is mounted shall be at right angles with the surface on which the one head slides and parallel with each other within 0.002 in. in

The size of the studs shall not be smaller than the "will go" end of the plug gage used for gaging the hole, and the same tolerance for wear shall be allowed as given in the table.

This stand may also be used for determining the quality of tooth bearing, provided satisfactory master gears are used.

For the determination of noise, a power stand shall be used, the essentials of which shall be the same as those of the hand stand, except that it shall be provided with power which may be applied in either direction, and there shall be a power brake.

The indicator shall be omitted and the movable head shall be controlled by a screw adjustment and clamping

In the hand test stands, it will be found an advantage, when once the stud holes are accurately bored in the heads, to bush them with hardened steel bushings, straight on the outside and tapered on the inside, so that the wear of putting the studs in and out can be largely taken care of by the taper, and new bushings can be substituted when the old ones are badly worn, without disturbing the accuracy of the original bored

Master gears in pitches finer than six, shall be within an eccentricity limit of .001 in.

In disputes concerning eccentricity, where master gears of proven accuracy are not available, a hardened gear with teeth cut away so as to have but one of its teeth in engagement at a time, may be used by rolling through the arc of contact and then ratcheting to the next tooth.

Bevel gears shall be inspected on hand or power stands for quality of bearing, and on reversible power

stands equipped with hand brake, for noise.

These stands shall be rigid in construction, the belt pull shall be downward rather than upward, so as to tend to seat the movable heads rather than pull them away from their bearings, the spindles shall lie in the same plane and be at right angles with each other within an error of .002 in. in 12 in., and the tapers of the holes in the spindles shall, if possible, agree with those in the bevel generating machines, so that work can be examined without removing from the arbor on which it was cut.

In straight tooth bevels, conical pointers may be used to prove whether the teeth are radial or not.

The above applies to such gears as are used in truck, tractor and automobile construction and not to the larger mill gearing.

#### Tooth Bearing

Questions of tooth bearing shall not be determined in the final assembly, but by inspection on test stands, as noted above.

#### **Splined Shafts**

For width of spline, root and outside diameter, use a "will" and "will not go" snap gage, made to dimensions given on customer's drawing for the work, or use a micrometer set to the same dimensions.

For accuracy of spacing, use a ring gage having one portion ground to maximum diameter of outside of keys and at one end an annular portion with a diameter of hole equaling the maximum diameter of the body of the shaft and milled and ground away so as to leave projections whose width and angle of face shall equal the minimum space between keys as given on the customer's drawing.

#### Sizes of Collets for Holding Stem Gears

Use holes in collets or bushings equal to the maximum shaft size plus the amounts given in Table I, when new, and also allow the same amount as given in Table I for wear before discarding.

## Fixtures for Testing Internal Ring Gears When Held by the Outside

Add to bore of fixture, when new, the amount given in Table I and also a like amount for wear before discarding.

#### Shifter Grooves

For diameter of bottom of groove, use "will and will not go" snap gage, slightly thinner than width of groove, or use micrometers.

The gage should be made to limits given on customer's drawing.

If the shifter groove has a fillet in the corner, a similar allowance plus clearance shall be made in the gage.

For width of groove use a "will and will not go" bar gage made to customer's limits for the work.

#### **Thread Gages**

Use plug or ring gages made by a reputable concern and in case of dispute, have checked by the Bureau of Standards. "Will and will not go" gages should be used for accurate work.

#### Machine for Checking Tooth Shapes

It is recommended that this association have designed and built an instrument for determining the accuracy of involute curves in cutters or work, and that it be installed in the Bureau of Standards at Washington.

#### Disputes

All disputes over the accuracy of micrometers, gages, etc., may at the request of buyer or seller, be referred to the Bureau of Standards, whose report shall be accepted as final and the expense of such testing borne by the owner of the instruments tested, unless otherwise agreed upon.

In making comparisons of dimensions, the same temperatures shall be used as are maintained by the Bureau of Standards.

### First American Airway to Be Constructed in 1921

THE establishment of well organized air routes throughout the country is essential to the progressive development of commercial and civil aviation. With properly equipped airways, flying will become a safe and efficient mode of traveling in this country. For this reason the proposed creation of a model airway between Washington, D. C. and Dayton, Ohio, during 1921 is a fact of special interest.

The project is being fostered by the Army Air Service, which is able to provide such equipment as is available for creating the route, but cannot purchase land or make financial expenditures. The expense will fall upon local civic and commercial organizations to whom the benefit of the airway will eventually accrue.

Certain stations on the airway will have gasoline, oil and spare parts for both Government and civilian aircraft. Charts will be made of the entire route at the request of the Army Air Service and also a photographic map of the route will be prepared. Oblique aerial photographs of every city, landmark and landing field will be taken and arranged into such form as to provide a guide to the route. Copies of these books can be signed for at one end of the route and turned in at the end of the

journey. Flyers along the route will be in constant radio communication with each other and with the various ground stations and in case of fog or clouds will be directed along the route by radio. Should a group of commercial ships desire to negotiate the route unequipped for wireless, then an airplane so equipped can be dispatched with them along the route and they can "follow the leader" in perfect safety.

A system has been devised for marking the landing fields along the route for purposes of identification and will serve as an aid to navigation. Each State is being divided into one hundred parts from west to east, and lettered alphabetically north to south, each letter representing a distance of 30 miles. A field in the northern part of Eastern United States marked O-55-B would be in Ohio, about half way across the State, and between 30-60 miles below the northern border. Since commercial aircraft will probably negotiate a 30-mile distance in slightly over 15 minutes locations by this system are sufficiently close together for navigating purposes. More minute detail will be provided in certain subdivisions of the system at or near landing fields and in the laying out of signs and letters.

# A Machine for Multiple Drilling and Tapping

Employs automobile type friction clutch in main driving pulley to enable the power to be shut off when a change in direction of rotation of spindles is made, thus overcoming disadvantage of earlier machines.

REAT success has been attained in the multiple drilling of motor castings and other similar parts, the reduction in cost over the use of a single spindle drill being such that no progressive concern can afford to do without multiple drills. Multiple tapping of holes has also been attempted, but has

not been uniformly successful, owing to the want of a satisfactory device for reversing the direction of spindle rotation when the taps have reached a predetermined depth. Friction clutches that have been employed for this work operated at too low speeds, and would not retain their adjustment. Positive clutches employed were subject to too great shock, and consequently were short-lived and subjected the machines to too severe strains. The Fox Machine Co. has placed on the market a multiple spindle tapping machine which is claimed to overcome these objections.

The upper drive pulley at the rear of the speed change box is built into a single drive plate friction clutch. Any of the standard automobile clutches, such as the Hoosier, Borg & Beck, etc., can be used on this drive. At the front of the machine is a lever with a cam surface, which either disengages this friction clutch or allows it to engage, thus furnishing the means for stopping and starting the machine.

On the vertical drive shaft to the head is a positive driving clutch with twelve right hand teeth on one side and twelve left hand teeth on the other. These teeth engage opposing members, which are carried by bevel gears, the gears being driven by a bevel pinion mounted on the horizontal shaft which runs into the speed change box. The operation of this clutch, which is used for reversing,

is also controlled by a lever at the front of the machine. This lever is interconnected with the lever which disengages the friction clutch.

When the tapping lever is moved from forward to reverse position, or vice versa, the first part of the movement disengages the friction clutch driving the machine. Further motion of the lever carries the solid tooth driving clutch from one position to the opposite one, this being accomplished while the power is off. After the positive clutches are in engagement, the final motion

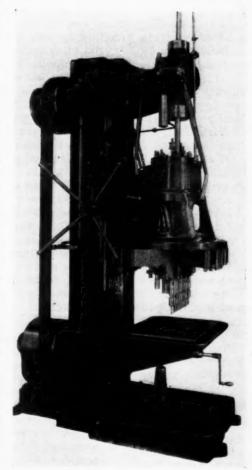
of the tapping lever allows the friction clutch to again engage, and the power is then transmitted through the positive clutches, driving the spindles in the reverse direction. Special provision is made against the possibility of the teeth of the clutches striking one on top of the other when being reversed, which would prevent the

> clutches from becoming engaged. When the tapping attachment lever is pulled forward, the spindles are given a right hand rotation. A heavy spring is put under compression, and is latched in this position. An adjustable stop on the vertical stop rod is so set that when the taps reach the desired position, the stop comes in contact with the trip arm, which releases the spring held under compression. The movement of this spring carries the tapping attachment lever automatically from the forward to the reverse position. Thus, the operator does not have to trip the tapping mechanism when the desired depth of hole is reached.

> The machine illustrated taps \( \frac{5}{8} \) in. holes in cast iron plates, 1\( \frac{1}{4} \) in. thick, in 5 sec., a maximum of 6 hp. being consumed. The main drive shafts are mounted upon ball bearings.

Special attention is called to the fact that all springs used are exceptionally heavy and entirely inclosed, so that the operator cannot tamper with them. Another feature is that, after the tapping attachment lever is thrown forward and the automatic trip locked in position, the operator can move the tapping lever back and forth, to reverse the direction of the taps, as rapidly as he desires, before the taps reach their bottom position. This is of special importance in the case of breaking a tap. The operator reversing the spindles under these conditions does not affect the trip-

ping of the mechanism when the taps finally reach their lowest position. The multiple spindle tapping machine shown is a Fox D-22. This mechanism is also applied to the D-12 and D-32 machines.



Multiple spindle machine for drilling and tapping

THE Packard Motor Car Co. has designed a 12-cylinder V-type aircraft engine developing 400 hp. for altitude flying, known as Model 1237. The weight is 735 lb., giving a specific weight of 1.85 lb. per hp. It is built on the over-dimensioned, super-compression principle.

# Where Is the Motorcycle Going?

With the coming of business depression and the falling off of foreign orders, the old question is again arising as to "What's wrong with the motorcycle?" This article is the first of a series of two which discusses from the standpoint of an interested observer the conclusions reached after a careful survey and a general analysis of the situation

By Norman G. Shidle

ONSTRUCTIVE criticism is almost an essential to the healthy growth of an industry. Probably no industry has been subjected to more criticism of this—and other kinds—than the automobile industry; certainly no industry has grown more rapidly and gained so strong a position in a comparatively short time. Certain phases of such criticism can sometimes be given better by an interested and intelligent onlooker than by those actively interested in the advancement of a particular part of the industry.

An examination of the field would indicate that such criticism has been lacking to a large extent in the motorcycle industry. Outside criticism has usually come from those whose only knowledge consists in having the quiet of their neighborhood disturbed by the open-cutout speed demon who still leaves behind him an oral as well as a visual impression in the being of bystanders. Criticism from this class of persons has been widespread and vigorous, but is not usually constructive. Much of it can never be printed in the Sunday school books.

The fact that the motorcycle industry is so largely concentrated in a few organizations has made the motorcycle press very strongly dependent upon the good-will of these few for its existence. As a consequence, criticism from this source has sometimes been weighed not alone on its qualities of justice in deciding whether or not it should be printed, but also in regard to the likelihood of its meeting with disfavor in one or another of the controlling concerns. Such a condition is not always conducive to the publication of that frank and honest criticism which is one of the chief functions of the business press and which ultimately works to the progress and advancement of the industry as a whole.

#### Progress of the Industry

It is worth while to examine what has been the progress of the motorcycle industry under these conditions, how it stands at the present time and along what lines future development is likely to go. The discussion logically divides itself for analysis into these sections:

- 1. Is the motorcycle industry progressing at a normal rate; that is, does it show a normal healthy growth during recent years?
- 2. Merchandising:
  - a. Past policies.
  - b. Present ideals; how far realized; co-operative possibilities.
  - c. Future development.
  - d. Undeveloped merchandising fields.
- 3. Motorcycle design:
  - a. Mechanical features.
  - b. What weight machine for future business?
  - Weight and cost of machine as related to future development of the industry.

The progress of an industry can be measured in a general way by production figures, sales—as denoted by registration and export figures—and by financial statements. The latter standard is difficult to use for the motorcycle industry because of the numerous firms that have entered and left the field during the last ten years. Production figures, however, can be estimated with a fair degree of accuracy, while export and registration figures are available in most instances.

The chart shown herewith presents the relation between motorcycle production, domestic sales and exports since 1913.

An examination of the production curve alone shows that the progress of the industry has not been steadily upward. Beginning at a peak in 1913, motorcycle production dropped sharply until 1915, when an upward turn was taken. This rise continued rather gradually until 1917, when another drop began. Since 1918, however, production has increased each year, the most rapid rise taking place during the last year.

Nor is there any indication that this variation in production progress is due to the coming and going of the several companies which have entered the field for a short time and gone out. Something like this same line would be found if production were charted for only the companies which have remained steadily in production throughout this period.

In other words, the curve indicates that during the last eight years the motorcycle industry has been doing little more than holding its own. While it is true that during 1918 and 1919 the manufacturers were unable to supply the domestic demand for machines, it must be remembered that these years were in every sense of the word unusual merchandising years; years in which the demand was abnormal and automatic; years during which heavy demand for machines did not necessarily indicate any real progress for the industry.

When it is recognized that there are some 14,000,000 more people in this country to-day than in 1913, it becomes evident that the motorcycle industry has not progressed in proportion to its increased possibilities for development, even taking into consideration the unfilled domestic demand of 1918 and 1919.

But any consideration of motorcycle progress, especially during recent years, must take into serious account the export trade. The accompanying chart shows, for instance, that over half of the 1920 production was shipped to foreign countries. This fact alone might account to a large extent for the extremely slight increase in domestic motorcycle registrations during the last year.

It is interesting to trace the gradual increase in the percentage of foreign business done by the motorcycle industry. The percentage of production sent to foreign countries since 1913 is as follows:

Per cent	Per cent
1913 5.8	191729.2
191410.4	191818.6
191515.7	191944.0
191630.8	192055.5

These figures show a steadily increasing proportion of American motorcycle production being sold abroad. This increase is materially broken only by the 1918 figure, which can probably be accounted for by the fact that some of the motorcycle plant manufacturing facilities were turned to other lines of government war work as were many automobile plants; also to the difficulties of making foreign shipments during this period.

Studying these percentages in connection with the

chart and the curve showing the relative trend of domestic and foreign business, certain rather definite indications stand out.

While motorcycle production during these years has been about holding its own, domestic business has fallen off very greatly. This indicates that only because of greatly increased foreign business has a market been found for the same number of machines as were formerly produced. Even recognition of the unfilled domestic demands of 1918 and 1919 cannot nearly account for a difference in domestic consumption between 1913 and 1920 of 31,000 machines.

This means that there has been during the last eight years a drop in domestic consumption equal to the production

capacity of the largest manufacturer and more than equal to the actual annual production of any of the large manufacturers for at least seven years. In other words, the industry as a whole at the present time is dependent upon the maintenance of this large foreign business if it is even to continue the production of as many machines as in the past. And the trend of the domestic consumption curve is downward at present, although domestic business, in the long run, must probably be relied upon as the foundation of the prosperity of the American motorcycle industry.

This not a healthy condition. What has brought it about?

When the failure of motorcycle registrations to increase was brought to the attention of one manufacturing executive recently, he said something like this: "Foreign orders have been very enticing during recent years. We have had large orders for twenty-five, thirty or fifty machines in many cases from one source. These orders came almost unsolicited, and, being for large quantities, gave us an opportunity to plan our production regularly for a period ahead. We took these orders for this reason. Consequently, we could not supply the

domestic demand for a time and have not intensively cultivated the domestic field during recent years."

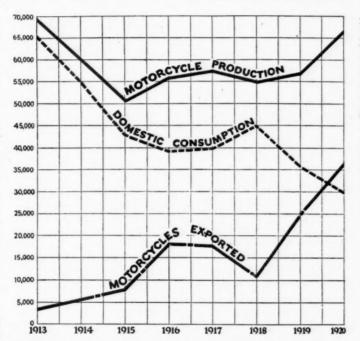
To an outside observer, this might seem a somewhat short-sighted policy. It savors a good deal of taking the path of least resistance without due consideration of the more fundamental and enduring phases of the motorcycle merchandising problem. The very fact that many of the foreign orders came without any great effort on the part of American manufacturers is some indication that the demand was abnormal. In any business the mere filling of present orders is not conducive to permanent progressive development.

The result in the domestic field is likely to be dissatisfied dealers, for one thing, and a natural clogging up of domestic merchandising channels due to disuse. Foreign business is highly desirable and the foreign field should undoubtedly be cultivated and extensively utilized. But when it overshadows domestic trade so that there is a possibility of decay setting in, a danger is presented.

This does not necessarily mean that such a danger point has been reached in the case of the motorcycle industry, but the trend of the curves is such as to make a serious consideration of this factor very pertinent. The figures and curves presented would seem to indicate the justice, in a general way, of this conclusion.

The motorcycle industry in the United States has, at the best, merely held its own during recent years. One present need is a careful study of the domestic market, and an intensive effort at development and cultivation in this direction. This development to be molded along lines directed toward a permanent progress for the industry, on the basis of

far-sighted intelligent merchandising policies, with an increasing emphasis upon the permanent features and a decreasing consideration of purely temporary advantages.



Relative trend of motorcycle production, domestic consumption and exports

#### Domestic Merchandising

There have been innumerable defects in the domestic merchandising of motorcycles. Some of these major defects still appear. No one recognizes this fact more fully than the executives of the various motorcycle companies, and definite efforts to remedy the faults are being put under way. The chief difficulties are so well known and understood as to need little discussion, so far as looking backward is concerned. They may be listed here, however, as a foundation upon which to base a discussion of remedies and future possibilities. The chief troubles are probably included in this list:

- 1—A class of dealers, skilled perhaps on the mechanical phases of their business, but lacking in merchandising ability and the social graces which accompany it.
- 2—Lack of cleanliness and attractiveness in dealers' showrooms and repair shops.
- 3-The predominating class of riders being those who pay little attention to personal cleanliness; and who

pay a similar amount of attention to the feelings of others by operating their machines in a noisy, unpleasant manner.

4—The overemphasis of the sporting phases of the motorcycle, particularly as shown in the speed and

5—The failure of some manufacturers and many dealers to visualize the merchandising possibilities of the motorcycle in a broad way; to build their business with an eye to permanent future progress.

6—The numerous road records that have been attempted, with the effect of advertising the motorcycle favorably to a few and unfavorably to many. In the same class were the motordrome races of several years ago.

A previous paragraph has stated that these troubles have been recognized by the manufacturers. This statement, perhaps, should be qualified to some extent, since the manufacturers do not entirely agree that all of the points mentioned are defects, and there is not entire accord as to the way in which even those recognized as defects should be remedied.

In the matter of raising the level of dealer representatives, progress is undoubtedly being made by the chief manufacturers. A survey of the dealer organization of one of the largest reveals a considerable number of high grade business men, intelligent, well-dressed, pleasant, courteous, and efficient. But it can scarcely be said that this number is anything like a majority as yet. Progress is being made; but is it being made rapidly enough? If it is necessary to wait until all the low grade dealers die before replacing them with progressive high grade men, the motorcycle business may suffer serious difficulties in the meantime.

Obviously, it would be absurd to disrupt a dealer organization by making a wholesale clean-out at any given time, but it must be recognized that every dealer with a dirty shop, interested primarily in mechanics to the detriment of courtesy, is a definite drag on the industry as a whole. The type of dealer determines to a large extent the type of rider. And every noisy, dirty, hell-bent-for-election rider loses more potential motorcycle sales than the fact of having him for an actual buyer is worth.

The very fact that the motorcycle industry is concentrated in a few hands sets up the danger of its getting in a rut. No industry can stand still for an indefinite length of time. It must go forward or it must go backward. There is always the danger in any small group of becoming bound by tradition, of becoming tied up in the round of "the way it has always been done," of lacking the shock of contact

with new ideas that is necessary to progress. Tradition when it is thoroughly good is an invaluable aid to any industry. But when it contains a number of unfavorable features it is a very great handicap. Thus in the matter of motorcycle dealer representatives, it would seem that a very definite and straightforward campaign were necessary to raise the level of this group if the industry is to go forward to its best possibilities.

This campaign can take two lines:

1. The education of the present dealer personnel.

2. The changing of the present personnel for a higher grade of men.

At the present time most of the effort is being extended in the first direction. It is a slow process, since very bad material upon which to work is presented in many cases. The manufacturer having obtained the vision of future progress for himself must sell the ideals and methods to many individual dealers, some of whom, possibly, are utterly incapable of understanding them.

While the work of dealer education is undoubtedly helpful and necessary, it is questionable whether or not it can get results quickly enough to offset in any marked degree the harm that this "uneducated" class of dealers is constantly doing to the ultimate progress of the industry.

With these facts in mind, the possibility of very definitely starting out to wipe the slate clean insofar as this type of dealer is concerned, is worth very serious consideration by motorcycle manufacturers.

The matter of cleanly and attractive salesrooms would be automatically solved by the substitution of a higher grade of dealers. The problem of rider education would also be somewhat softened. This would be true not only because of the fact that the dealers would naturally appeal to a better class of rider, as well as to those who now ride, but also because the dealer himself would set an excellent example as a rider.

The truth of these facts is attested by an observation of the results obtained already by that group of dealers already in the business who may be said to constitute men of superior ability and merchandising effectiveness. There are such men selling motorcycles to-day. But there are not enough of them. And the favorable impression which this small group makes upon the public at large is still much more than offset by the unfavorable impression made by the other group, which still predominates rather strongly.

### Weight of Chassis Components

N his paper prepared for the annual meeting of the S. A. E., D. McCall White gave some figures on the weight of parts of the LaFayette chassis which are of interest. It should be pointed out that this chassis has a 348 cu. in. engine developing 90-95 hp. at 2800 r.p.m.

The weight of a stripped chassis, complete with electrical equipment, battery, radiator casing, oil, grease and four tires, is 2570 lb. The weight of the engine averages 7.2 lb. per hp. complete with flywheel, all accessories, including carbureter, throttle and ignition, control rods, lighting and ignition units ready to run as in the car. The transmission complete with clutch and torque ball casing, universal joint and brake equalizer, weighs 160 lb. The front axle weighs 106% lb. The rear axle complete with torque rod, propeller shaft and driving shafts, weighs 385.94 lb. The steering gear complete with control rods, steering arm and ball, tubes, spark and throttle gears, weighs 34% lb. The weight of other parts is as follows:

	Lb.	Oz.
Clutch hub	4	12
Piston	1	91/4
Single connecting rod (finished*)	1	131/4
Forked connecting rod (finished*).	1	$15\frac{3}{4}$
Camshaft (rough)	22	
Camshaft (finished)	9	121/2
Crankshaft (finished)	31	
Wrist pin (finished)		23/4
Tappet roller pin (finished)		.64
Tappet (finished)		2.6
Valve (inlet and exhaust same wt.).		4.8
Tappet set screw (finished)		1/2
Fan and generator shaft	1	41/2
Main transmission shaft	5	$10\frac{3}{4}$
Rear hub (finished)	63/4	
Propeller shaft	181/2	
Rear driving pinion and shaft	4	6.4

<sup>\*</sup>Without bushing.

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# Program Outline for the Foreign Trade Convention

Topics selected for annual gathering in Cleveland in May are of constructive value. Advertising and financing are prominent among the subjects. Motorcycle foreign trade has been developed in excess of domestic trade. Automotive developments in many countries.

THE program for the Eighth National Foreign Trade Convention, which will be held in Cleveland May 4, 5, 6, 7, has been outlined and is quite constructive in its scope. The general theme is "American Foreign Trade and Its Present Problems." The program, following the reception and preliminary meetings on Tuesday, is as follows:

#### WEDNESDAY, MAY 4

#### THURSDAY, MAY 5

Banquet ......7:30 P. M.

#### SATURDAY, MAY 7

2. Final Declaration of the Convention.

#### Tientsin as a Car Market

A PPROXIMATELY 600 motor cars are in daily operation in Tientsin, China, which is rapidly becoming an important motor car market, as dealers there handle the cars and trucks going to Peking and a wide stretch of Chinese territory, including Mongolia and stretching over into many parts of Manchuria and Siberia. According to the Oriental Motor of Shanghai, the city of Tientsin has six car importers, which handle a number of American and European lines.

Several passenger services are operated out of Tientsin and one is contemplated between Tientsin and Peking. The latter trip, it is calculated, will require somewhat more than five hours of traveling.

Efforts are being made by the North China Motor Club to revise the motor license system, which is now quite bad. Each of the foreign concessions, of which there are six, and the native city require a separate license and, unless each license is paid, driving is restricted.

Recently Consul General Fuller of Tientsin wrote to the Department of Foreign and Domestic Commerce:

"There is considerable complaint, however, because there are no distributers of American automobile accessories, especially tires, in China. Any American firm which maintained ample stocks of accessories at a central distributing point, such as Shanghai, and could supply local houses without delay would increase the sales of its product in the district."

#### **British Tractor Prospects**

THE position and prospects of farm tractor business in Britain may be gaged from the following comments based on information disclosed recently in the legislature:

According to a Ministry of Agriculture return, the acreage of land in England and Wales under arable cultivation on June 4 (last) was 12,020,000 acres, being 289,000 acres less than a year earlier, and 379,000 acres less than on June 4, 1918. On the other hand there were 1,022,000 more acres in arable condition on June 4 last than on the corresponding date in 1914.

Allowing 250 acres per tractor, the added 1,022,000 acres arable since 1914 would find work for 4088 machines and for 1516 more, but for the return of 379,000 acres to fallow since 1918. On the same basis of computation, the 12,020,000 present arable acreage should require 48,080 tractors

to work it steadily, without allowing for a contingent—say 10 per cent—of stand-by machines.

It is doubtful if there are more than 12,000 tractors available in Britain, but since the holding of the tractor trials last year, and the possibility of its becoming a yearly event farmers are awakening to their value and necessity.

The high cost of farm labor, foodstuffs for cattle, and the better financial return more or less guaranteed to farmers for their cereals, are factors tending to the good of the tractor movement in Britain. Nevertheless it is necessary that the price be got down to not exceeding \$1,300 (pre-war rate of exchange) if their sale is to be developed.

The type looked for is something on the Fordson model, but not necessarily with a barrel-like cast chassis. The mechanism must be enclosed and self oiling and the drawbar capacity should be equal to three ploughs cutting  $5 \times 10$  in. (British farmers won't plough deeper or wider than  $6 \times 11$  in. in light land, and two furrows on heavy land). The haulage capacity should be equal to pulling a 4 ft. x 8 in. threshing machine, and the belt power should cover the requirements of that size—the largest and most used—of threshers. The belt should lead fore and aft and not transversely and should be capable of some variation of speed.

Makers here are beginning to provide two diameters of pulley, usually one at either end of shaft, and others are listing a pair of interchangeable pulleys of varying diameters. The high speed engine tractor won't suit. The sort required is a medium speed engine of fairly large bore and preferably with vertical cylinders, amply jacketed to prevent boiling. Detachable wheel grips—preferably angles—also are essential, and they should be such as can be removed or replaced in an hour.

#### Foreign Trade is Major

I T is interesting and exceptional to learn that there is one branch of the automotive industry that has regarded foreign trade so highly that it has accorded to this trade a greater distribution of its products than it has to the domestic trade. This is the motorcycle division of our industry. On another page of this issue a motorcycle manufacturer is quoted as quite frankly stating that his company found foreign trade so easy to handle and so satisfactory, that no attempt was made to meet all of the domestic demand. As a result of this peculiar situation, the foreign trade in motorcycles has become greater than the domestic trade.

This incident should be a worth while thought to some other automotive exporters. It is also true that one large producer of trucks has built a considerable trade by looking to only foreign outlets.

#### Czecho-Slovak Show

THE week of May 28 has been selected for the thirteenth International Automobile Show to be held in Czecho-Slovakia, according to a report of the Bureau of Foreign and Domestic Commerce. It will be under the direction of the Czecho-Slovak Automobile Club (Ceskoslovensky Klub automobilistu) in the Industrial Palace and other buildings at Prague and cars, trucks, tractors, motor plows, motorcycles and equipment will be exhibited. Seventy-four exhibitors were represented at the successful showing last year. Application blanks and information may be obtained from the club or from the Czecho-Slovak Legation at Washington.

#### An Australian Car

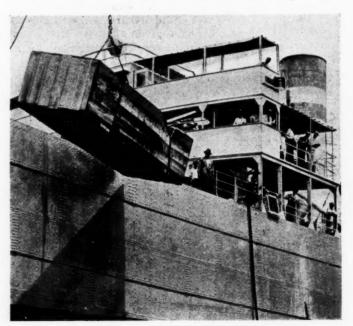
A "noting the inability or unwillingness of British motor car makers to cater for the Australian trade,"

(to quote his own words), points out that Australia has need of a light, medium-priced and economical car; that America has filled the bill, but the advanced rate of exchange and customs duty has tended to raise the price unduly. Accordingly an effort to market a home-made car is being made at Sydney. There a "Six," made of American parts, is being assembled and, he says, is sold as an Australian car! It is proposed now to make all of it excepting the engine in Australia, and the engine is to be of Australian design. The scheme is largely due to S. Hamilton Grapes, who for several years was the Australian representative of the Albion Motor Co. of Glasgow. The selling price of the new "six" is estimated at below \$2000.

#### Market for Spark Plugs

THE markets for spark plugs in China, India, Indo-China, Japan, Netherlands, East India and Australia are discussed in a report of the Bureau of Foreign and Domestic Commerce dated Feb. 4, 1921. In making up the report, several of the consular officials have given late estimates of the number of automobiles in their districts. The consular district of which Tientsin, China, is the center, reports a census of from 1500 to 2000 passenger cars, 60 motor trucks and 75 motorcycles. Ceylon is said to have about 3000 motor cars and 1600 motorcycles. Indo-China is estimated to have from 5000 to 6000 motor vehicles, and the statement is made that in Japan there are considerably more than 6000 automobiles and 3000 motorcycles. The number of cars in the Melbourne, Australia, consular district (including the states of Victoria and Tasmania) is placed at 22,265, with motorcycles approximately 13,685.

## An Export Crating Experience



Here is a graphic less on in export packing. You will note, by looking closely at this photograph, that the truck crate has broken under the strain of the lifting chains. This photograph was made on the New Orleans dock by a photographer who was seeking to illustrate an article on export shipping. It was not made as a warning to shippers, but that appears to be its best use. The lumber specifications of this crate are not available, but the shipping firm has had much experience in export

# Wide Field for Motor Trucks in Textile Industry

A survey conducted by *Textile World* indicates that many textile manufacturers are getting great satisfaction from the use of trucks. Light trucks are finding increasing favor, while many users are studying the pneumatic equipment problem seriously. The results of this valuable survey are summarized here.

JUST before the business slump hit the textile trade an interesting survey was conducted by Textile World concerning the use of motor trucks in that industry. A questionnaire was sent out and replies were received from 414 mills located in various parts of the country. In selecting the list of mills to whom the questionnaire was sent due regard was paid to size, character of product and location, with idea of showing average conditions in the various branches of the industry and different sections of the country.

The foreword to the report of this survey states that "as much care was taken to exclude large mills known to be extensive users of motor trucks, as in eliminating a large number of small mills that could not be expected to use trucks. In fact, with the exception of one large corporation using 55 trucks, none of the other mills reporting uses more than seven trucks. It would have been quite possible to load the report by adding a half-dozen large corporations who are known to have anywhere from 25 to 35 trucks, and we are not certain that such inclusion would not have given a fairer average result, for one of the surprises of the questionnaire has been the large number of small mills reporting the use of two or three trucks ranging up to five tons each."

The answers to certain of the questions bring to light interesting information of vital interest to those concerned with merchandising trucks. The report as published by *Textile World* comprises not only a presentation of figures obtained but an exceptionally clear analysis of what those figures mean in the light of the circumstances involved. For this reason the report is summarized here as being of special value to truck sales managers.

The questionnaire included ten questions, some of which brought forth more accurate answers than others. Several of the questions pertained to the cost of operation of the trucks. The statement of the report concerning the answers to this group is rather striking:

Answers to these questions, the report states, "are too incomplete to render them of material value, and disclose the fact that very few textile manufacturers keep cost and other statistical data relating to their trucking." It is likely that a similar survey in other fields would show similar results, and the lack of accurate operating cost data in connection with most trucks is a factor which must always be taken into consideration.

Despite the fact that accurate costs had not been kept. however, the answers to the question "Relative cost of present haulage as compared with old?" indicates, according to the report, that "the great majority of textile manufacturers using motor trucks are entirely satisfied

with the results obtained, even in certain cases where they estimate that the cost of motor trucking is greater than that of haulage by horse-drawn vehicles." Seventy mills answered this question intelligently and of this number 42 stated that motor trucking is less expensive than horses, while 13 said that the expense was about the same. The other 13 believed the cost of trucking to be greater.

#### Number of Firms Using Trucks

The 414 answers showed that approximately half of the firms used motor trucks. Of this number 153 actually owned trucks, while about 20 per cent more have their trucking done on contract. There was no indication that the location of the plant had any influence on the use of trucks, although bad roads might limit the use, of course, in a specific instance.

#### Small Trucks Popular

One important question related to the size of trucks used. The replies indicate that there is more work for light trucks of less than  $1\frac{1}{2}$ -ton capacity than for any other kind. The proportion is as follows:

	Number	Per cent
1½ ton or less	118	35.4
2-3 ton	95	28.4
3-4 ton	66	19.8
5 ten	45	13.5
5-10 ton	10	20

These figures indicate that more than 60 per cent of the trucks used in this industry are 3 tons or less in size. This carries out the opinion expressed by some truck experts that the trend in truck use will be toward larger numbers of medium-sized trucks, with the gradual reduction in numbers of the larger capacity vehicles.

Touching upon this angle of the matter, the reports say: "When textile mills first started to utilize motor trucks they confined their purchases to two to five-ton sizes for their heavy trucking of raw materials, and finished goods; they were not long in learning that for small loads and quick work these heavy trucks were uneconomical and the use of trucks of 11/2-ton and smaller has been rapidly increasing. The tendency to-day among textile mills of medium and large size is to utilize a standard equipment consisting of one or more trucks of 11/2 tons or less, a two to three-ton truck for mediumsized loads and a three to five-ton truck for heavy work; another important development is the utilization of five to ten-ton trucks for the hauling of coal and ashes, and some of the smaller mills located at a distance from railroads are using these big units. Another interesting

development among textile mills is the utilization of both small and large motor buses for transporting operatives to and from their work, thus making it possible to secure the services of help in adjacent towns and villages. The equipment of the largest mill organization reporting is as follows:  $1\frac{1}{2}$  tons and smaller, 12; 2 to 3 tons, 18; 3 to 4 tons, 20; 5 tons, 5. It may be of interest to note that most of the finishers use medium and large size trucks, while knitters favor the small sizes. The finisher's loads are usually heavy and the haulage for long distances, while knitter's loads are usually light. The character of goods trucked by cotton and woolen mills varies as widely as the size, character and location of the mills themselves, but the tendency, as previously noted, among medium and large-sized mills is toward a standardized equipment consisting of small, medium and largesized trucks. The same statement applies to the large silk mills, although the use of  $1\frac{1}{2}$  ton and smaller trucks is quite common in this part of the industry."

#### **Opinions on Pneumatic Tires**

Two of the questions asked related to the use of pneumatic tires. These questions were as follows:

1. Do you use solid tires?

2. What do you think of pneumatics on trucks?

Answers to these queries brought 140 replies. Of this number 117 or 84.5 per cent, are using solid tires, while the other 23, or 16.5 per cent, reported pneumatics in use.

The replies indicated, however, that textile users of trucks are giving very serious attention to this question. They show that the present use of pneumatics in the textile industry is confined chiefly to the lighter trucks and for long distance work where speed is an important factor.

A considerable number are also using pneumatics on the front wheels of heavy trucks with the idea of saving the engine from unnecessary vibration. There seemed to be considerable sentiment, however, for the use of pneumatics on heavy trucks for long distance work for the purpose of decreasing vibration and thus lengthening the life of the truck and also for making possible a higher rate of speed.

#### Trailers

Only 9 of the 145 mills which answered the question regarding the use of trailers stated that they did use such equipment. On this point the report states that "most of the mills answering in the affirmative make use of trailers for long distance haulage of raw material or finished goods, either between widely separated mills of their own, or to and from freight stations, processing plants, or raw material markets. It may also be stated as our opinion that demountable bodies are much more likely to become standard equipment among textile mills for trucking purposes than trailers."

#### **Type of Goods Hauled**

The truck salesman must know, of course, the type of goods to be hauled if an intelligent sale is to be made. The report asked the various manufacturers what sort of material they were carrying in their trucks and brought forth rather comprehensive answers on this point. A summary of the information contained in these answers is presented by the following quotation from the report:

"Textile raw materials, goods in process, finished goods and mill supplies are the principal classes of merchandise for which motor trucks are used, and they are handled in a large variety of forms, but very few of them require the use of special bodies. Textile raw materials are handled in bales and bags ranging in weight from 150 to 1000 lb. Yarns and other stocks in process are handled in bags and cases as a rule. Finished goods are usually cased or baled, and range in weight from 100 to 500 lb. Mill supplies are of large variety, but require no special form of truck or body that is not utilized for other similar purposes; for instance, many mills are using five to ten-ton coal trucks for their coal and ashes, while others are making use of special bodies for carrying lumber."

The answers to this questionnaire as a whole present a great deal of information specially valuable to the salesmanager and offer a number of suggestions for further investigation and analysis.

## Structural Analysis and Design of Airplanes

POR the official information and guidance of the Air Service and those interested in aeronautics, the Engineering Division, McCook Field, recently published a book bearing the above title. The more specific object of the book is to give designers reasonable methods for the structural analysis and design of the component parts of an airplane structure. The view is expressed that the acceptance and use of a single system of analysis will tend toward uniformity in design and ease in checking calculations and in making comparisons between different airplanes.

The general procedure followed in the book is to take as examples of the different structural units of an airplane, actual standard designs chosen to illustrate as many phases of the work as possible, and to follow through each step of the analysis and structural design. All the main equations and computations are given in full. These are supplemented by explanations, drawings and diagrams where necessary for clarifying the text.

The following chapter headings may give something of an idea of the scope and method of treatment of the work: Principles of Applied Mechanics and Strength of Materials, General Considerations, Wing Stress Analysis, Miscellaneous Designs, Airplane Chassis, Control Systems, Control, Surfaces, Fuselage, Appendix.

The fact that the book was compiled by the Structure and Aerodynamics Branch, Airplane Section, Engineering Division, is sufficient guarantee of its authoritativeness.

### Vital Factor in Time Study

THE essential relation of the time-study man to harmonious industrial relationships has been emphasized in AUTOMOTIVE INDUSTRIES from time to time. The opinion of a well-known consulting engineer on this point is of interest. William O. Lichtner of the Thompson Lichtner Co., said recently before the Society of Industrial Engineers:

"One of the first things to be impressed upon the minds of our would-be time-study man is that he is studying human beings like himself. This means that no one should be allowed to enter this field until he has learned the lesson of properly regarding the human element." S

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#### Automotive Fuel Injection Engines Possible

Editor AUTOMOTIVE INDUSTRIES:

It is hardly necessary to assure you that work such as that accomplished by Mr. Ricardo and described in his article in your issue of Feb. 24 ought to make most of us feel very small indeed. A point to emphasize, however, is that, for experimentation on such a variety of engines and with such a variety of experimental features, great resources appear to be necessary. As far as this country is concerned, I think even now, after so much awakening to the importance of the subject of fuel economy, it is not yet superfluous to emphasize to manufacturers the fact that investigation and research pay, and that for real progress quantitative measurement and scientific detail analysis are every bit as necessary as invention.

AUTOMOTIVE INDUSTRIES deserves high credit for bringing this paper of the great English engineer before the American public. There is no question that in this country we have now talent enough and inventive genius enough to duplicate and perhaps improve upon any results obtained abroad the minute we are set going strong in the right direction. If Mr. Ricardo's paper is to serve as a stimulus for work in a new direction, it is somewhat unfortunate that it should have come when capital is so reluctant to go into research and new development work.

In one point I should like to differ with Mr. Ricardo. He speaks of his bitter experiences with Diesel engines. Unquestionably the automotive Diesel engine is not an easy problem to solve, yet the fact is that one of the great mail order houses of the country now lists regularly in its catalog a farm engine of injection type and of as little as 3 in. bore. Also at least tolerable success must have been obtained in Germany by the Junkers engine, in France by the Bellem and the Bregeras and Caffort engines, and in England by the Blackstone engine, all using injection in one form or another. We all know that the large size injection engine is a complete success. When Mr. Ricardo announces that he has completed an aeronautical engine of 8 in. bore, operating successfully at 1350 r.p.m., it would seem to me that sizes have been reached where there ought to be little difficulty in applying the injection principle. C. A. NORMAN.

# Disinterested Tests Preferred to Economy Contest

Editor AUTOMOTIVE INDUSTRIES:

In an editorial of one of your recent issues you suggested that it would be advisable, as a means of arousing public interest in fuel conservation, to arrange a public competition in which different makes of cars might participate. In the writer's opinion, such a competition might arouse public interest, but its results would be harmful rather than otherwise, in that the conclusions drawn by the public from the competition would almost certainly be wrong ones.

The relative showing made by an entrant in this com-

petition would depend upon, first, the general efficiency of the car and motor design; second, the amount of special pains taken in getting this car and motor in better condition than the average car of the same make; third, the skill of the operator and his ability to make a better showing than would the average driver; fourth, points of special adaptation which are known to increase the fuel economy but are not practical for general use.

As instances of the second item, pistons might be used with more clearance than standard; special pains might be taken in running in motors and other parts; also special spring, tire and wheel bearing equipment. An instance of the third item would be the use of a carbureter adjustment much leaner than the average driver would tolerate, requiring the use of a choke or dash adjustment each time the throttle is opened; another would be the practice of throwing off the switch and throwing out the clutch every time the speed of the car is decreased. Item No. 4 would include various means of causing the engine to operate more nearly at full load conditions at all times, either by the use of a higher gear ratio or loading the car down to increase the effort required to pull it. A similar increase in economy could be made by raising the compression to a point where it would be unsafe to open the throttle wide.

Now it is evident that in a competition involving a number of different cars it would be impossible for the most competent engineer, and far beyond the general public, to analyze the showing of a car in respect to the different points just mentioned. It should also be borne in mind that the entrants from each factory would be more keen about the advertising value to be obtained from the test than the development of scientific knowledge and it is very probable that many special points of construction, along the lines referred to above, would be kept secret.

It would seem to the writer that the desired ends would be obtained to a much greater extent if experiments or public demonstrations were conducted by a disinterested research committee, on a single car or motor, showing the relative saving of fuel possible with different methods of driving, different conditions of motor and running gear, different fuels, different temperatures of intake manifolds, compressions, gear ratios, etc. In this way accurate comparisons could be made, there would be no question as to the correctness of the conclusions reached and there would be no danger of the experiment degenerating into a mere publicity and advertising contest.

F. C. Mock.

A MEMBER of the Society of Automotive Engineers who has been instrumental in furthering standardization of truck parts has recently received from George E. Roberts, vice-president of the National City Bank, a letter from which the following extract is taken:

"We have got to look to the engineer very largely for help in our industrial troubles; that is to say the most promising solution for our troubles is in greater efficiency in the organization and equipment of industry. The work that your organization is doing in standardizing automobile parts is of great significance, and if similar work is done throughout the industries we will make substantial gains."

# What of the Safety and Personnel Departments?

The widespread elimination of safety and industrial relations departments indicates that they were established as temporary measures and are not viewed as of permanent operating value. Discussing matters with the workers is not a favor, but a matter of good business and production value.

By Harry Tipper

A SURVEY was made recently of the position of safety engineering as a special occupation in many of the large industries at the present time, as compared with its position in this respect a year or so ago.

Safety engineering developed to a very considerable degree just prior to the war and during the war. A number of men were engaged in specializing in this kind of work, and a great many improvements were secured, because of the exhaustive consideration of the matter and some understanding of its relation to efficiency in operation

A rather large bibliography grew up around this and special publications were confined to its consideration. It is a little disturbing, therefore, to find that this work has been considered as such an outside matter, that the safety engineering department has been eliminated almost entirely in a number of cases. In other instances it has been cut down to such an extent that its effectiveness is lost and it will be a difficult matter to build the organization up again.

In one case, where a concern used forty-three safety engineers, with an extensive department created for the special study of safety work, all but three of those have been eliminated, and consequently practically all the research and most of the development work has been dropped. Some of the work in this establishment consisted in bringing the safety necessity home to the worker, making him understand his responsibility in connection with the matter.

The value of this kind of discussion does not end with the safety work, yet the department is ruthlessly cut even though the engineering departments are maintained with all the key-personnel remaining on the job. Something similar has happened to the industrial relations departments in a good many plants.

The elimination of these departments is not in itself so important. In both cases they are matters which should be a part of the training of every executive and a definite part of the quality and ability demanded of them. The practical elimination of these departments, however, indicates that they were not viewed as permanent necessities of analytical and operating value. This is the disturbing feature of the case.

It is not to be expected that such departments would remain full of men in a time of low industrial activity, but the fact that they have been practically wiped out in a number of cases indicates the attitude which has been taken toward them by the responsible executives in the establishments concerned. I have no brief for the erection of such departments in the first place, although it may be necessary to put specialists upon the studies of these matters, because of the general lack of intelligence among executives regarding them. It has been my firm opinion that nothing will be secured of great moment in the analysis of the human relations within a plant, until all executives who have charge of workers and who determine the policies are required to study the human side of the question.

It is evident that a good many of these departments of safety engineering and industrial relations have been created without a sufficient analysis of the matter and without a proper understanding of their functions or their value to the establishment. This has led to their acceptance because of temporary conditions, labor shortage, difficulty of meeting labor demands, and so forth, as an extra necessity on account of these conditions and not as a fundamental branch of the business, directed to the study of important matters.

Despite the existing evidence concerning the potential capacity of the human being, over and above the actual capacity which he puts into his work, there appears to be a general disbelief in the validity of humane methods of drawing out this potential power and putting it to work.

Most executives still think discussing matters with workers is an act of generosity, a sop to the workers or a matter of so-called welfare. Comparatively few of them have considered the matter as good business and necessary to the greatest production value. When mention is made of the results achieved in an establishment where these matters have been considered seriously, the first reaction is that such establishments are different, that other establishments were unsuccessful, or that the old way is best.

It is worth while repeating at this point, several of the fundamental reasons for the study of the human side and the fundamental values which can be expected from the proper kind of co-operative effort within the plant.

(a) The number of examples we secured during the war, when the general efficiency was decreasing, showed that it was possible to secure from 50 to 125 per cent increase in production capacity from the same workers with the same machinery and operations.

In some of these plants despite 100 per cent increase in wages the labor cost per unit of production had decreased a small percentage.

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None of these things were due to improved machinery or any new system of development, but almost entirely to the discussion with the workers, the consideration of the workers and the feeling of co-operation which permeated the establishment.

(b) The studies of fatigue have shown that the mental factors of fatigue exercise a more important influence upon the production pace than the physical fatigue involved. In other words, the fatigue induced by the loss of interest and incentive translates itself into a greater physical effect than the fatigue directly resulting from the physical motions. This tends to establish a minimum pace and prevents the worker from putting forward his full power in the working operation.

(c) The rate of pay per hour doesn't have any very important bearing upon the possible cost per piece. Hours have been reduced without increasing the cost, and wages have been increased without increasing the cost per piece.

The relation which is presumed to exist in most of the discussions upon this subject is incorrect and leads to many false calculations, limiting the efficiency and destroying the value of the final observation. It is somewhat amazing that so little attention should have been paid to this matter and yet the presumption that a direct relation exists between wages paid and work done runs through 90 per cent of the discussion about wages that is going on at the present time.

(d) The industrial establishment is at present utterly divided in its outlook upon production, prices, reward of capital and other matters which intimately concern all parties engaged. There is a continual warfare between the groups in industry for the establishment of their own advantage and a continual disagreement which consumes an enormous amount of time, eliminates a very large amount of useful effort and adds to the cost of every operation which is conducted in the process of getting raw materials to the point of consumption.

These are practical items. They relate to costs; they relate to the limitation of the buying power; they show a large amount of waste effort, and they add to the burden which must be supported by industry and the consumer.

Yet these are the items which can be overcome only by a study of the human side of the question. The mathematics of industry are governed by the humanities of the case and not vice versa, as we seem to expect. These practical points are of sufficient importance in their effects upon industry and of sufficient volume in their relation to total costs to warrant the most careful examination and painstaking study. Yet, while the manufacturer retains his engineering department, almost intact in many cases, he has practically eliminated the industrial relations department, the welfare division and the safety engineering.

An old business philosopher said to me many years ago regarding the practical man who argues only from experience, "The man who is limited to what he can see and practice is the most impractical business man of the lot." Certainly this is true of the executive who shuts his eyes to the importance of the human side and the study of its fundamentals and its relations.

## An Elevating Dump Body

(Continued from page 608)

position by the hydraulic hoist, which is controlled from the driver's seat in the usual way. The release hooks are engaged, as indicated by the hand lever resting in the forward position. To illustrate the method of operation, grasp a lead pencil between the thumb and fore-finger of the left hand, at about onethird the distance from one end, and hold it in a horizontal position. With the other hand press down on the short end. If an object representing the dump body were on the long end of the pencil, it would, of course, be elevated. The thumb and forefinger of the left hand represent the pivot shaft of the main elevating lever which is supported by the elevating frame. The forefinger of the right hand pressing down on the short end of the pencil represents the pull rods pulling down on the lower end of the main elevating lever.

If it is desired to dump without elevating—that is, in the ordinary position—the release hook lever is thrown toward the rear, thereby releasing the pull rods. The hoist is then operated in the usual manner. The body resting on the elevating frame, is raised at the front end

The body is made with a capacity of 80 cu. ft. for soft coal, and with less capacity for other materials. The height above ground of the bottom of the body when loaded is 6 ft. The hoist has a cylinder diameter of 6 in. The elevating frame is made of rolled steel channel 6 in. deep, weighing 10½ lbs. p. ft., well braced by ¼ in. thick cross members. The total weight of the body,

hoist, elevating mechanism, telescoping chutes and bagging chute is 2950 lb.

### British Government Assists Aviation

THE British Cabinet has approved (subject to Parliamentary sanction) the grant of a sum for the direct assistance of civil aviation. During the financial year 1921-22, payments under this grant will be limited to a maximum sum of £60,000 and will be made to British companies operating on approved aerial routes. They will be calculated, subject to the above limitation as regards the total sum available within the year, on the basis of 25 per cent. of the total ascertained gross revenue of each company—exclusive of the Government grant—earned by the carriage of passengers, mails or goods.

The routes at present approved are London to Paris, London to Brussels, and London to Amsterdam. Extensions to these routes and additional routes, such as England-Scandinavia, on which the possibilities of a service employing flying boats or amphibian machines, or a mixed service of sea and land aircraft, can be demonstrated, may be approved from time to time if satisfactory proposals are received by the Air Council. The maximum time allowed for journeys between London and Paris, between London and Brussels, and between London and Amsterdam will be four hours from aerodrome to aerodrome, or such other time limit as may be determined later by the Air Council.



PUBLISHED WEEKLY Copyright 1921 by The Class Journal Co

Vol. XLIV

Thursday, March 17, 1921

No. 11

## CLASS JOURNAL COMPANY

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Entered as second-class matter Jan. 2, 1903, at the post-office at New York, ew York, under the Act of March, 3 1879.

Member of Associated Business Papers, Inc.

Member of the Audit Bureau of Circulations.

Automotive Industries—The Automobile is a consolidation of The Automobile (monthly) and the Motor Review (weekly), May, 1902, Dealer and Repairman (monthly), October, 1903, and the Automobile Magazine (monthly) July, 1907.

### Government Helps for Business

ANY business men are holding the hope that with Herbert Hoover as Secretary of Commerce there will be a decided change for the better in the matter of appropriations for this department which means so much to the business world. Especially hopeful are those who are interested in export trade.

During consideration of the recent appropriations bill it was shown that the amount set aside for the Bureau of Foreign and Domestic Commerce was less than one-fiftieth of one per cent of the total appro-Secretary Hoover priations for the Government. should be able to secure an increased proportion of the total to be voted in new appropriation bills. The business men of the country will certainly support him in such a request.

They appreciate the need for economy in government expenses, but are not committed to any policy which precludes expenditures, the results of which promise so much benefit as will result from a wellorganized and intelligently operated Bureau of Foreign and Domestic Commerce.

### Movable Track Automobiles

T HE chain track principle was introduced in connection with beauty trace. nection with heavy tractors that are required to pass over soft ground and through boggy places, the earliest application (or intended application) of this mechanism probably having been in connection with artillery haulage. During the war the chain track vehicle became widely known through its use for tanks and artillery tractors. In peaceful applications the outstanding feature of the chain track vehicle is that it can pass over soft, marshy ground where even a horse cannot obtain a footing, and where the use of ordinary wheeled vehicles would be entirely out of the question.

At the present time, a very large proportion of our road transportation is by motor vehicles, but there are two conditions of American country roads under which these vehicles are practically useless—when the roads are heavily covered with snow in winter and when they are deep with mud in February, March and April. It is quite possible that the movable track will help in overcoming this difficulty. Such a track for a light vehicle will probably have to be made of fabric belting, because a metal chain track would be too noisy, and if used in mud, would be subject to much wear. Naturally a vehicle equipped with such a track could not travel at the same speed as an ordinary wheeled vehicle on hard roads, but this would not be necessary. As both snow and mud are temporary conditions, it would not pay to build vehicles specially to run only on movable tracks, but the proposition of constructing tracks adaptable to standard automobiles looks promising. In a snow contest recently held in France, a car fitted with such a track was conspicuously successful, and a portable track for use on Ford cars has been developed in this country and is undergoing tests.

We have been building hard roads quite rapidly during the past ten years, but there is still an enormous mileage of roads in the country which are practically impassable for several months of the year. If some simple and relatively inexpensive attachment can be developed which will enable the ordinary automobile to negotiate any road at any time of the year, it will evidently add immensely to the practical value of cars which must in some way meet this condition.

### The Elusive Saturation Point

E VIDENCE accumulates that ambitious statisticians are again turning to the problem of the "saturation point" of automotive vehicles. This is probably due to disappointment on the part of those who predicted evil days were ahead of the industry when the partial shutdown of automotive factories took place last fall. So many persons did not realize that factories making articles that had been regarded as necessities for years were also shut down-stockings, for instance. Now that the automotive industo

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try bids fair to be on high speed before some other industries, these prophets are seeking another basis for pointing out to our industry the exact location of its untimely grave.

Such prophets overlook the history of "saturation point" statistics. So many "saturation points" have been passed that they might be compared with the water that runs under the bridge. It does not appear to these persons that an automotive vehicle stands for transportation; that transportation is a part of civilization and that as long as civilization advances, transportation must advance with it. Railroad saturation probably will be reached first, because the automotive vehicle is an assistant to the railroad. Neither of these units of transportation will reach a saturation point until they are replaced by a better means of transportation.

There was a popular play in New York this winter called "Not So Long Ago." It was a violent reminder of how few years ago the "stationary bath tub" was the subject of discussion. This now more or less universal article of household equipment was then called "immoral" by some of its critics. At the same time the bicycle was making its appearance. How bitterly it was denounced! To-day the bath tub and bicycle industries are greater and more substantial than ever before. Both have a set place in every day life and scoffers of "not so long ago" must admit their error.

# Passenger Car Body Standards

THE need for standardization of passenger car body parts would appear to be quite as important as similar work in connection with chassis parts, yet there seems to have been nothing accomplished in this direction in spite of the fact that great benefits have resulted from similar efforts relating to other parts of the car. This situation is, perhaps, due to the fact that body engineering has not kept pace with other branches of automotive engineering, while much body construction is still carried out according to old-fashioned methods used in carriage building.

Under these circumstances the first meeting of the Passenger Car Body Division of the S. A. E. Standards Committee held in New York last week can be regarded as marking a new epoch in the body industry. The new division does not, of course, expect to standardize any one design or group of body designs, nor does it plan or hope to fix dimensions that will limit initiative or prevent originality on the part of the designer. It may ultimately prove possible to agree upon certain dimensions that will facilitate in some measure interchangeability as between body and chassis of approximately the same size and typeas is already being planned by the Truck Division in connection with truck bodies—but for the present the committee plans to confine its work to standardization of body parts, hardware and materials, in some cases simply setting down for reference purposes practice which is now more or less generally followed.

Among the items which will probably receive consideration on the part of the division at an early date are: Top irons, window runways, size and thickness of glass, door handle square shank and hole, gage

sizes for sheet metals, dimensions of stock shapes and mouldings, wire sizes for fender beading, nickel plating standard, door hinges (pressed and malleable), standards for leather and top materials. If the division is able to make progress in the development of these standards, that alone will amply justify its organization, yet these items represent only a very small part of what can and no doubt will finally be done.

The division as now constituted includes representatives of five body manufacturers, five car manufacturers who build their own bodies, one manufacturer who builds both bodies and chassis as well as bodies for other chassis builders (some of these being custom bodies), one body parts manufacturer and one consulting body engineer. Only six of the thirteen members attended the first meeting of the division. It is to be hoped that later meetings will be better attended, for the industry will watch the work of the division with interest and expect much from it. It should, and we believe it will receive the hearty support of all whose co-operation is sought.

# Disrupting a Tax Policy

A N indication that the National Automobile Chamber of Commerce was wise in eliminating details from the tax program appears in a recent report of a ballot by the members of the Chamber of Commerce of the United States, which always carried its projects to the last possible detail.

One of the points of this ballot was a sales tax. The idea was defeated. Next came a ballot on the kinds of a sales tax. Even those persons who voted against the sales tax voted on this detail, and three sorts of sales tax had about equal support.

The hopelessness of developing a tax theory that will be supported by the membership of the Chamber after this division is evident. These are details that the N. A. C. C. plan will leave to the technical tax workers.

# Ways and Means

DURING this period of readjustment when wage decreases are common, it is very interesting to follow the reaction of the workers in specific cases, and to attempt to analyze the reasons for that reaction in any given instance.

There are already numerous cases on record in which wage reductions have been met by a strike or by a strong protest of some kind. In a few cases, however, the readjustment has been made without difficulty, the employees shop committees even voluntarily making the reduction in one or two instances.

The way in which the management went about making the reductions undoubtedly had much to do with the reaction on the part of the workers. Those firms which have taken the trouble to consult, explain and reason have had by far the best success. No man can be expected to enjoy having his income decreased, but it is possible for him to be "sold" on the temporary necessity for it. And if he is to be retained as an employee he must be "sold" or his work will not be permanently efficient.

# Ford Operating on Own Resources

# Bank Loan Deferred, May Not Be Needed

Rapid Turnover of Surplus Cars and Inventory Helps Finance Factory Operation

DETROIT, March 14.—The Ford Motor Co. to-day is employing more than 20,000 men turning out around 3,000 cars a day, and is "going it alone" so far as finances are concerned. AUTOMOTIVE INDUSTRIES is able to say positively that Henry Ford is not seeking financial assistance, and for the time being at least, is operating successfully without it.

Just how long the company will be able to continue operation without financial help is a matter of conjecture, though it is reasonably certain that the company will ask for a bank loan about the middle of April when the thirty-day extension period granted the Ford Company by the Government for the payment of the first installment of taxes will have expired. That this money will be available without any delay or controversy also is certain.

The facts in the Ford financial situation are as follows: In January Henry Ford sent to New York for a representative of the New York bankers to come to Detroit to discuss finances. This representative came and the situation was gone over thoroughly. The banker suggested that Ford would need about \$50,000,000. Edsel Ford, however, was of the opinion \$75,000,000 would be required.

#### Ford Men Satisfactory

The hitch came when, as the climax of negotiations the banker set forth conditions upon which the loan would be made, among which was the stipulation that a treasurer must be installed to succeed F. L. Klingensmith, who would be satisfactory to the bankers. Henry Ford was asked to name three men which he did, one of whom was W. R. Campbell of the Canadian Ford plant. The bank representative scratched out the name of one man but announced that either Campbell or the third man would be all right. Campbell at that time came over to the Ford plant and remained for more than a month, and it was presumed he would be made treasurer, though he finally has determined not to join the organization.

With the matter of the treasurership settled, it looked as though the loan would be made, but Henry Ford balked at one other condition set forth and refused to accept the loan with this other stipulation included. He expressed the determination to go ahead with production without financial help, and the bank representative advised him that he felt confident Ford under the circumstances could do this successfully. The proposition of placing the plant under bank control, rumored as the stumbling block, was not touched upon.

#### Debt Reduced to \$24,000,000

This advice was given in view of the fact that Ford had reduced his indebtedness to around \$24,000,000 by the conversion of Liberty Bonds, which had been deposited as collateral to secure that loan. The further fact that Ford cars were selling steadily and that the company was reducing its inventories at a good rate, prompted the banker to offer his suggestion that it would be possible for Ford to operate without financial help at least until this bank indebtedness became due together with the Government taxes.

In other words, the proposition was put to Ford exactly this way: His obligations with the extension of time granted by the Government would not become due until the middle of April. It was possible for him to operate until that time without financial help. It was also possible that he might meanwhile, through extraordinary sales demand, be enabled to make whatever settlement became necessary the middle of April without asking for aid at that time. In the event, however, that bankers holding Ford notes insisted upon payment when those notes became due again at the same time the Government taxes were payable, Ford could have at his command as much money as he wanted from the banks on the condition they imposed. He could run until his last dollar but always had the knowledge that a telegram would bring him any money needed.

#### Interest at 81/2 Per Cent

The loan sought in January and the loan that will be made in April—if it is made—was to be and will be at 8½ per cent gross, considered by bankers to be very reasonable. During the negotiations Henry Ford and his son Edsel agreed that they would not take any dividends pending the life of the loan, volunteering this to the banks' representative.

The bank indebtedness against the Ford Motor Co. represents notes upon which renewals have been asked five times, it is reported. It also is said with reasonable assurance that a sixth renewal on a majority of these notes will

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# Ford Treasurership Is Left Unfilled

Campbell Declines Position—To Continue with Canadian Company—Co-ordinate Work

DETROIT, March 11-Considerable interest has been aroused in the future of the Ford organization by the fact that W. R. Campbell of the Ford Motor Co. of Canada finally and definitely has refused to become associated with the American organization. Campbell was sent for by Henry Ford soon after the resignation of F. L. Klingensmith as general manager, and it is said Ford offered him the position vacated by Klingensmith. Campbell was reluctant to leave his Canadian post, but Ford urged him so strongly that Campbell remained at the Highland Park plant from the time of the reopening until last week virtually in charge of the organization

It was unofficially stated at Highland Park three weeks ago that Campbell had finally declined to become general manager, but would accept the office of treasurer. In fact, Campbell himself admitted he had finally refused to become general manager and virtually admitted he would accept the treasurership.

What developed to cause Campbell to change his mind is not known. Close friends quote him as saying he had seen too many bigger and better men than himself summarily dismissed or forced to resign for disagreement on company policy and did not "intend to go along with the procession."

At present Ford himself is said to be in active charge at Highland Park as well as the River Rouge plant, where tractor production was started two weeks ago. C. E. Sorensen, who has held the title of general manager of Henry Ford & Son, divides his time between River Rouge and Highland Park and virtually is looked upon as General Manager of Ford properties.

#### Kanzler Heads Production

Since the resignation of W. G. Knudsen, E. C. Kanzler has been in charge of production at Highland Park. However, the title of production manager has not been conferred on Kanzler, and Ford recently intimated it was his intention to eliminate titles and co-ordinate the work of the various departments with direct control of the big organization centered in the group of executives headed by himself and including Edsel, Sorensen, E. G. Liebolt, Ford's private secretary; W. A. Ryan, general manager; B. J. Craig, secretary; Fred Diehl, purchasing agent, and Kanzler.

# Hoover Makes Foreign Trade Plans

# Standardization Aim to Be Important One

Reduction of Wheel Sizes One of First Suggestions Expected— Stresses Economy

WASHINGTON, March 11-Standardization of automobile wheels will be suggested to the automotive industry by the Department of Commerce as part of a nation-wide movement toward standardization of manufactured products. In reorganizing the Department of Commerce for improved efficiency to business, Herbert C. Hoover, the new Secretary, contemplates extension of Government co-operation with trades and industry for the promotion of foreign trade against other competitors. The Government will in no way force regulation but will endeavor to accomplish its aim by proof of necessity and then by co-operation with industries.

Secretary Hoover is convinced that foreign governments are mobilizing the export trades, and in some cases the import, for militant commercial invasion. His studies abroad showed him that foreign merchants are obtaining support of their governments in pooling which will decrease manufacturing and distribution costs. This governmental assistance or even subsidy allows the European manufacturers to compete with American exporters at home and abroad.

In his first interview with Washington correspondents since assuming the Cabinet portfolio the Secretary cited automobile wheels as an instance where standardization would prove effective. He said that it was possible to cater to the needs of the automobile users by reducing the number of wheel sizes from 11 to 4. Secretary Hoover contended that this reduction in models would automatically reduce the expense of keeping rubber stocks by half. He asserted that the experiences of the war had demonstrated the necessity for standardization and its economies.

#### Lower Costs Imperative

American manufacturers must lessen production and distribution costs immediately if they are to preserve their standing on foreign markets, the Secretary says, because the tariff would only protect against invasion of domestic markets and have no effect on competition abroad. He contends that everyounce of efficiency is needed for American industry to recuperate and extend its markets abroad.

Hoover's interest in standardization of automobile wheels would indicate that he will encourage the research activities of the Bureau of Standards which is under his supervision. This Federal agency has made numerous investigations relating to standards in the automotive trade but failure of Congress to provide additional funds has somewhat checked its work. It is believed that with a national movement for standardization, it would be an easy matter for Secretary Hoover to obtain special or deficiency appropriations for whatever scientific inquiry the Bureau might undertake.

The question of economies of distribution will undoubtedly be stressed in all branches of business. It is here where the economies of highway transportation will be demonstrated, for shippers are desirous of relief from rail-hauls.

## Statistical Division to Undergo Change

WASHINGTON, March 15—Automotive trade associations and individual exporters will be consulted shortly by a special committee appointed to-day by Secretary of Commerce Hoover, to reorganize and revise the methods used by the statistical division of the Bureau of Foreign and Domestic Commerce. Numerous complaints have been received as to discrepancies in export and import statistics and suggestions will be studied.

Exporters of automobiles, trucks and tires have manifested unusual interest in foreign trade statistics of late in order to gage the condition of foreign markets and the revival of competition. Manufacturers have complained to the secretary that there were numerous discrepancies in the figures prepared by the Bureau of Foreign and Domestic Commerce for August. Inquiry developed the fact that customs officials were overburdened and omitted certain items for that month. This error makes the official figures on all commodities open to question.

The committee, headed by William S. Rossiter of Concord, N. H., will conduct an inquiry into this mistake and revise the records.

The blunder in compiling official statistics sheds light on the failure of the Department of Commerce to publish data within a reasonable period. It is stated that errors are incidental to decoding and preparation for publication of reports from the collector of customs at New York.

#### Suggest New York Location

The small appropriation makes it impossible for the bureau here to furnish manufacturers with information and this import material is prepared by underpaid, and in many instances, inefficient clerks. It has been suggested that the statistical division have headquarters in New York.

# Will Seek Enactment of Favorable Bills

Lower Rail Rates to Seaboard Important—Would Erect American Warehouses

WASHINGTON, March 15-Secretary of Commerce Hoover has indicated his intention to promote foreign trade in automotive products and other commodities on a gigantic scale. There is reason to believe that he will urge upon the new Congress legislative measures which will aid the movement and sale of American products on foreign markets. It is understood that he will recommend the liberalization of the Webb-Pomerene and Edge acts, lower freight rates to the seaboard and equitable ocean rates, establishment of American banking agencies abroad and erection of American warehouses at the principal foreign ports.

Business men, principally manufacturers, have complained to the new Secretary of Commerce that the rail traffic will not bear the present freight rates. He has been advised that the industrial centers of the country will be moved unless relief is accorded in transportation rates. Traffic experts believe that the commercial map will be changed by the removal of industries toward the seaboard, so that the rail haul will be relatively short. If the railroads do not lower their rates it is believed that shippers will turn to a more extensive use of trucks and waterways, which provide cheaper transportation.

The establishment of warehouses in foreign countries is regarded as essential to the success of American foreign trade. It is known that British and German traders own or control warehouses to-day in countries where American exporters are cultivating trade. Though American goods are stored in these places, it is known that the owners would naturally endeavor to dispose of goods manufactured in their countries which compete with American products.

#### Discrimination Hurts Trade

The Department of Commerce has a plan under consideration which would to a large extent prevent this discrimination against Americans. Warehouses constructed by the Government and in charge of consuls or other Federal agents would undoubtedly help American traders. There is also a proposal to extend branches of the Federal Reserve system at the principal ports.

In suggesting standardization of automobile wheels, Hoover made it clear that his proposals for standardization in all industries were made to allow more effective competition on foreign markets.

# Durant-DuPont Deal Disclosed in Report

G. M. C. Holdings Taken Over for \$23,790,600 in Cash and Stock Consideration

NEW YORK, March 14—Details, hitherto carefully concealed, of the spectacular financial transaction by which W. C. Durant retired almost over night as head of the General Motors Corp., are disclosed in the annual report of E. I. du-Pont de Nemours & Co. It shows that when Durant was unable to meet his obligations last November, the duPont Securities Corp. took over 2,504,273 shares of General Motors stock. He received for his holdings \$23,790,600 in cash and 40,000 shares of the stock of the Securities corporation which was formed to buy his General Motors stock.

It is stated in the report that the taking over of the stock was at the request of Durant, who had informed the duPont interest that "he desired to resign and sell his interest in the corporation to liquidate his personal indebtedness, which was very large and press-

On the basis of the amount of money paid to Durant it is figured that he received \$9.50 per share in cash for his General Motors holdings. The 40,000 shares of stock of the duPont Securities Corp., it is stated, have since been exchanged for 230,000 shares of General Motors common stock, which again gives him a substantial holding in the concern. If a value of \$13 per share were placed on this amount of stock it would add \$2,990,000 to what Durant received for his original holdings and would bring the amount up to about \$10.70 a share.

At the time of the transaction there was much speculation in Wall Street as to just what amount was involved in the exchange. Estimates made at the time placed the amount at \$27,000,000, but it was also gossiped around the Street that Durant received only between \$7 and \$9 a share.

#### Show Details of Financing

The financing of the transaction whereby the stock was taken, it was pointed out, was by the sale of \$20,000,000 one-year 8 per cent collateral trust bonds of the duPont Securities Corp. through J. P. Morgan & Co. These bonds fall due on Nov. 22 of this year, but in consequence of this maturity the report states that the officers "are now working on plans for the permanent financing of this additional investment on the General Motors Corp., the details of which plan will be communicated to the stockholders as soon as completed."

In addition to the notes sold through the banking firm, the duPont American Industries Co., the stock of which is 100 per cent owned by the E. I. duPont de Nemours Co., paid into the treasury of the duPont Securities Co. \$4,200,000 in cash and loaned 824,179 shares of General Motors, for which it received \$4,-200,000 in shares of the 8 per cent cumulative preferred stock and 36,000 shares of the non-voting common stock of the new company. The Chevrolet Co. paid \$2,800,000 in cash and loaned \$549,453 in shares of General Motors, receiving \$2,800,000 preferred and 24,000 shares of the common stock of the duPont Securities Corp.

#### Obtained 4,000,000 Shares

By this method, it was also pointed out, the duPont Securities Corp. obtained \$27,000,000 in cash and borrowed 1,373,-632 shares of General Motors common stock. This stock, with the 2,626,368 shares taken over from Durant, gave the duPont Securities 4,000,000 shares of General Motors, which was pledged with the bankers for the \$20,000,000 loan. It is also stated that the banking group received 20,000 shares of the common stock of the duPont Securities Co. as a commission for the loan. This was paid out of the 60,000 shares received by the duPont American Industries and the Chevrolet Co.

The report also states that under the same transaction with Durant the duPont Securities Corp. took over 122,095 shares of General Motors common from a syndicate consisting of the duPont, the Chevrolet companies and Durant. For this stock they paid \$2,163,557 cash, which was the equivalent of \$17.72 a share. This stock, however, has since been sold.

## Durant Not Seeking Studebaker Control

NEW YORK, March 14—Formal denial has been made by W. C. Durant that he is seeking control of the Studebaker Corp. to make it the nucleus for Durant Motors, Inc. The reports became current when Durant bought a large amount of Studebaker stock in the market.

#### STUDENTS TO VISIT PLANTS

PHILADELPHIA, March 11—Twenty-seven seniors of the Mechanical Engineering School of the University of Pennsylvania have left here on an extensive tour through the Middle West. This will include a trip to the new factory building of the Cadillac Motor Car Co. of Detroit. The men are accompanied by Prof. R. H. Fernald, of the mechanical engineering department. They will inspect plants in Pittsburgh, Chicago and St. Louis.

#### PUBLICITY BRINGS BUYERS

DAVENPORT, IOWA, March 12—Automobile dealers in this community report a 50 per cent increase in trade within the last week. An early spring and an active publicity campaign which took the place of the usual automobile show were responsible for the revival, they said. No adequate exhibit room could be secured and the dealers went into an aggressive publicity campaign.

Indications are that the season will be a record one, some dealers said, and all of them have felt a business revival which has drawn expression of surprise.

# Maxwell Defends Chalmers Merger

Asks Dismissal of Partition Suit Filed in Wilmington— Fixes Valuation

WILMINGTON, DEL., March 11—An answer has been filed in the United States District Court to the suit of Charles J. True against Maxwell Motor Co., Inc., by Carl Tucker the vice-president.

He claims numerous errors in the bill of complaint. Special stress is laid upon the fact that the book value of the stock of the defendant corporation, stated at \$22,117,230.80 as of Dec. 2, 1920, is liable to deductions for reserves for depreciation, contingent liabilities aggregating \$4,513,265.80, and furthermore that said book value, approximately \$134 per share on the outstanding first preferred stock, is largely dependent on the defendant being a going concern.

Excepting the amount of the aggregate tangible assets of the Chalmers Motor Corp. these are asserted to have had the value on Dec. 2, 1920 of \$4,519,722.57 and not \$435,014.02 as alleged in the complaint.

It is admitted that a meeting of stock-holders called to be held in this city on or about Oct. 19, 1920, has been adjourned from time to time, and has never been held, but proof is demanded that a properly accredited representative of the plaintiff was appointed to attend this meeting, and holds that the cause of the adjournment of the meeting was the failure of the defendant to receive a sufficient number of proxies to constitute a quorum.

It is admitted that the bill of complaint filed on Jan. 14, 1920, in the District Court for the southern district of Michigan, as well as others in Indiana and Ohio, was filed for the purpose of averting the danger of judgments, levies, etc., substantially all of the property of the defendant being located in these three states, the courts assuming jurisdiction and control of the assets.

It is denied that the equity in defendant's property is sufficient to provide for the full value of the plaintiff's stock and that of other first preferred creditors in case the property of the defendant is liquidated. The dismissal of the bill of complaint is asked.

A petition for leave to intervene in the suit has been filed by Robert W. Seaton of New York, owner of 200 shares of first preferred stock of Maxwell Motor Co.

#### ELECTRICAL SCHOOL FORMED

MILWAUKEE, March 14—The School of Automotive Electricity of Milwaukee has been incorporated with a capital stock of \$100,000 as a development of the department established about two years ago by the School of Engineering of Milwaukee to train specialists in automotive electrical engineering.

# Firestone Business Reaches 60 Per Cent.

Starts Second Shift on New Production Schedule—Surplus Nearly Exhausted

AKRON, March 12—Although directors of the Firestone Tire & Rubber Co. of Akron voted under date of March 15 to pass the common stock regular quarterly dividend due March 20, the company lists a surplus of approximately \$33,000,000 and states that it has more than \$7.500,000 in cash in bank.

The Firestone statement, issued in connection with the dividend action of directors, is one of the most optimistic issued by any rubber company in Akron since the beginning of the tire industry slump last May. The company is now producing about 7000 tires daily, and is operating five days a week with full eight-hour days. It is one of the first Akron tire concerns to reinstate the second shift, and is now operating two eight-hour shifts on tire production. The second and third shifts were dropped when the low ebb of the tire industry slump caused all Akron concerns to retrench and to reduce production to less than 25 per cent of normal.

Firestone reports that its surplus stock of tires is almost exhausted and that increased production is necessary to replenish these stocks, due to the rapid increase of tire sales. For the first ten days of March the company's business took a decided spurt, sufficient to warrant the official prediction by President H. S. Firestone that his company would do business in excess of \$6,000,000 in March. The company's sales for the past fiscal year were \$114,980,969, as compared to \$91,078,513. Figuring on this basis, Firestone is now doing nearly 60 per cent of its average monthly business of last year. This is perhaps a higher percentage of respective normal business than is being done by any Akron tire company at the present time.

In addition to being one of the first to re-establish the second shift, Firestone is also the first Akron tire concern to begin re-employing men. During the past few days several hundred men have been taken on. Great care is being exercised by the employment division, however, in picking from the many applicants those formerly employed by the company, with preference shown to married men and to men on record as the company's former most efficient workers.

#### Miller Stocks Run Low

The Firestone prediction of a shortage of tires is strongly corroborated by recent action of the Miller Rubber Co. of Akron in calling in all available supplies of tires from districts where sales have been slow, in order to rush such stocks to points where sales are increasing rapidly. This action will preclude necessity, for the time being at least, of materially increasing production.

The Goodyear Tire & Rubber Co. has just increased production from 35,000 tires to 60,000 weekly, which is slightly less than one-third of peak production. Whether the company puts on any great

less than one-third of peak production. Whether the company puts on any great number of men will depend largely upon the successful consummation of the company's refinancing program involving \$85,000,000.

### **Business Renewals**

Detroit—Property of Adrian Tractor Co. at Adrian, Mich., has been attached by several concerns holding claims for construction material. The Adrian Tractor Co. was formed last fall, and a sale of stock to secure funds for the construction and operation of a factory was begun but was stopped by the industrial depression.

Detroit—Columbia Body Co., which builds commercial bodies and truck cabs, has purchased a new plant containing 40,000 feet at Ford City, Mich. Increased business of the company and orders in prospect necessitated the expansion, officials say, and as quickly as the plant can be put into production, between 150 and 200 men will be employed.

Detroit—Erdman-Guider Co. officials announce receipt of an order for a large number of bodies for the Sheridan unit of the General Motors Corp. The bodies are constructed in Saginaw and painted and trimmed in the local plants. Company officials say indications are that the company would require an output of 5000 bodies this year.

Sheboygan Falls, Wis., March 14—The Falls Motors Corp. has increased its working force to nearly 400, and is now on a regular operating schedule of 9 hours a day, after running on a greatly reduced schedule since Oct. 1, 1920. The normal force is about 700 men. During the reduction of operations the engineering staff erected and equipped a new testing room with a capacity of 300 engines a day and otherwise improved the plant to increase efficiency to the utmost degree. The company builds 95 per cent of the parts entering into the construction of Falls motors.

#### TO BUILD HIGHWAY TRACTOR

FOND DU LAC, WIS., March 14-The Bull Dog Tractor Co., originally organized at Oshkosh, but later moved to Fond du Lac, has completed the first unit of its new plant. The company will build tractors for general purposes, but will specialize in machines designed especially for highway construction, and accordingly has named the machine the Hi-Way Locomotive. It has made excellent connections with concerns building road building apparatus without power units. The design also embodies a power operated from the driver's seat for stump-pulling, cumbersome obstructions. removing moving buildings, and many other uses where power is required.

# Dunlop Production to Start April 15

Plant Will Employ 7000 Men by Jan. 1, 1922—Company's Finances Arranged

BUFFALO, March 14—Production of tires at the River Road plant of the Dunlop Tire & Rubber Corp. of America will be started April 15. Nearly 7000 men will be employed at the plant by Jan. 1, 1922, of whom 99 per cent will be from Buffalo.

R. W. Snow, legal advisor of the company, made the announcement to-day before Chairman Charles B. Hill, of the Up-state Public Service Commission, when the counsel for the tire company urged that the International Railway Co. should be allowed to extend its River Road tracks to give transportation to

the men employed by the company.

P. D. Saylor, vice-president of the company, said that an office force had been organized and is at work and that a small working crew is on the job cleaning up and making ready for the resumption of activity.

It is planned to start manufacture this spring and to finish up the construction work. Saylor said that the key men of the organization have been retained and that all will be in readiness when the time comes for resumption.

Construction work at the Dunlop plant was suspended the first of the year and nearly the entire staff and corps of men which had been built up during 1920 was taken off. It is understood the company has now arranged its finances and is ready to start operations.

# Public Fails to Buy Dunlop Stock Issue

(By Cable to AUTOMOTIVE INDUSTRIES)

LONDON, March 12—Underwriters of the new \$15,000,000 issue of first debenture stock of the Dunlop Rubber Co., Ltd., have been left with 73½ per cent of the issue on their hands. The public subscription amounted to only \$3,750,000. In spite of this result, however, Dunlop stock is quoted higher on the market.

Rolls-Royce will pay dividends of 10 per cent this year as compared with 15 per cent last year. The net earnings amounted to \$963,885, or about the same as last year, but the directors decided to reduce the dividend rate because of conditions in the automotive industry.

#### CHARLES G. STODDARD DIES

NEW YORK, March 12—Charles G. Stoddard, who with his brother founded the Stoddard-Dayton Automobile Co. and later became vice-president of the United States Motors Co., died yesterday at Galveston, Texas, aged fifty-seven. He was born in Dayton, was graduated from Princeton, and retired from business recently because of ill health.

# Rail Strike Threat Brings Truck Call

### Council of National Defense Makes Plans for Mobilizing Motorized Transport

WASHINGTON, March 14—Serious thought is being given by the administration to the possibility of a general railroad strike as a result of the announcement by nearly all roads that the wages of all classes of employees will be drastically cut in the interest of economy and in the hope that lower freight rates can be given to stimulate business.

Unofficial but none the less authoritative information has reached the White House that if the pay of their members is reduced, the four great brotherhoods will advocate a strike in opposition to such a program. While it is the general belief that if there were such a strike it would be of brief duration, the Council of National Defense is preparing for a mobilization of the motorized transport to prevent suffering and economic disaster throughout the country. It is known that the council has devised a plan for the allocation of motor trucks. This program is based upon concrete data already in its possession and from State legislation lists.

The council will not assume control of highway transport unless it is evidenced that the railroads are unable to function properly. The council is dependent largely upon the co-operation of the State executives for the organization of volunteer motor truck associations at strategic points at centers of population.

In the last transport crisis when the brotherhoods threatened to quit, the Council of National Defense asked the various governors to obtain data as to the character, capacity, ownership and location of motor trucks throughout the State. The governors in turn addressed communications to the municipal authorities asking for their co-operation in obtaining pledge cars from direct owners in the local zones.

#### Congress Action Harmful

The failure of Congress to provide appropriations for the maintenance of the Council of National Defense has handicapped this organization in completing a survey of trucks and other forms of highway transportation, which they regarded as essential to the nation's safety. The council now maintains a skeleton organization for the purpose of rounding out its affairs before the end of the present fiscal year. In the event of a national crisis in transportation there is but little doubt that Congress would authorize additional expenditures in this

Communicaions received from governors show that in the majority of States, at least, it will be an easy matter to organize an efficient transportation system over the highways. The Federal Government, however, is not prepared to render assistance in highway transportation in any such proportion as heretotofore. The depletion of War Department trucks through sales has been rapid during the past year.

According to Army officials there are 19,000 trucks which are available for army purposes. Out of this total 13,000 trucks are in active service with the military service. The other 6000 machines could be placed on the road for service on receipt of an order from the Secretary of War. The Secretary of War is the chairman of the Council of National Defense. The War Department had approximately 40,000 serviceable trucks and cars a year ago.

## N.A.C.C. Starts Survey of Truck Mobilization

NEW YORK, March 12—A survey on the mobilization of motor trucks has been undertaken by the truck committee of the National Automobile Commercial Club. The information gathered will include the number of trucks operating in each city, their ton mileage and the type of service in which they are employed. This information is expected to enable manufacturers to estimate more accurately potential truck markets. The survey undertaken to determine the number of motor trucks on farms is about half completed.

Governor Miller of New York has announced his intention of appointing a highway transport committee. Its membership will include state officers whose duties include the development of good roads and citizens interested in the same subject.

## Whittaker Takes Charge of Truck Sales Managers

DETROIT, March 14—Don F. Whittaker has been elected executive secretary of the National Association of Motor Truck Sales Managers and has assumed charge of the association affairs at headquarters, 1157 Book Building.

Whittaker has been in the motor truck business for several years with the Federal Motor Truck Co. and the Acason Motor Truck Co. He was a charter member of the association and has been active in its work.

Homer Hilton, who has been managing director of the association, has become vice-president and general sales manager of the Winther Motor Truck Co.

The next directors' meeting of the association will be held here March 25. Definite action will be taken toward furthering of plans for 1921 under Whittaker's jurisdiction.

#### JOHN D. DODGE WINS BEQUEST

DETROIT, March 15—Settlement out of court of the contest instituted by John Duval Dodge to break the will of his father, John F. Dodge, automobile manufacturer, was announced here today. Young Dodge, bequeathed an annuity of approximately \$1,500, is to receive \$2,000.000 of the estate, estimated at \$80,000,000.

# N. Y. Central Tries Truck Experiment

#### Special Equipment to Try Store-Door Delivery Plan in Western Cities

NEW YORK, March 12—An interesting experiment in the store-door delivery of express matter will be undertaken this week by the New York Central Railroad Co. in co-operation with the American Railway Express Co. The plan will be put in operation first in Chicago and Cleveland and standardized trucks will be used in its development.

A. H. Smith, president of the New York Central, has been much impressed with the possibilities of the motor truck as an auxiliary to the railroad. After careful consideration of the subject, his engineers recommended the construction of special express cars which would carry nine steel containers uniform in size which could be loaded from the trucks at the point of origin and unloaded to trucks at the destination.

The trucks will be driven to the point where the merchandise is to be loaded and then to the railroad yards, where the containers will be hoisted onto the specially constructed cars. When the destination is reached, cranes will lift the containers to the trucks and the merchandise will be delivered directly to the establishments of the consignees.

Each container will be 9 x 6 ft, and will have a capacity of 6000 lb. It is estimated that the cars which will carry them can be loaded and unloaded in 40 minutes. The New York Central is paying the expense of the experiment and is providing the standardized trucks which are to be used. If the plan proves as successful as is expected it will be extended to the main shipping points on the New York Central system.

#### RENEW TRUCK RATE REQUEST

NEW YORK, March 12—The traffic department of the National Automobile Chamber of Commerce has renewed its application to the Western Classification Committee for second class freight rates on motor trucks in carload lots and on chassis. The difference between first and second class rates on carload shipments of motor trucks to such western points as Denver, Kansas City, Omaha, and Dallas amounts to from \$40 to \$80 and more a car.

#### NEW ENGLAND GETS REOS

HARTFORD, March 15—Russell P. Taber, Inc., Hartford Reo distributor, finds business so good that it is necessary to receive cars by the trainload. There is now in transit from the Reo factory to the Hartford dealer a trainload of Reos made up as follows: 36 speed wagons, 34 touring cars, 10 roadsters, 8 sedans and four coupes. This big shipment is in addition to the regular February allotment of 50 cars which were all sold.

# Urge Use of Trucks in Harbor Project

Engineers Would Cut Time and Expense from New York Development Cost

NEW YORK, March 12—The New York Chapter of the American Society of Mechanical Engineers has gone on record in favor of the use of motor trucks for the pretentious harbor development project undertaken by the New York and New Jersey Port and Harbor Commission. The alternative plan suggested by B. F. Cresson, chief engineer of the commission, is the construction of an electrically operated subway system extending all the way around the port through which loaded freight cars would be sent, with distribution points for rapid loading and unloading. It is estimated that such a subway would cost \$280,000,000.

The engineers have taken the position that the same work could be done by motor trucks at only a fraction of the cost and no serious engineering difficulties would be involved in their use.

Motor truck interests are deeply interested in the project and their chief advocate is B. F. Fitch, president of the Motor Terminals Co. of Cleveland, Cincinnati and Chicago. Fitch also heads a similar company which has been incorporated in New York. His views on the subject were presented to the mechanical engineers and he now is seeking to win the support of the Harbor Commission, although Cresson is in disagreement with him.

It is the contention of Fitch that the use of motor trucks for such work would not be in any sense experimental and that development of the harbor in this way would consume only a fraction of the time required for the construction of a subway. He also asserts that the cost of operation would be considerably lighter. If the use of trucks is decided upon, thousands of them would be required for the work.

#### LA CROSSE GETS SITE OFFER

OSHKOSH, WIS., March 14-The industrial committee of the Oshkosh Association of Commerce has undertaken a campaign to secure the removal of the plant and headquarters of the LaCrosse Tractor Co., LaCrosse, Wis., to Oshkosh. It is proposed to organize a new corporation with \$2,000,000 capital. The La-Crosse interests are said to be willing to invest one-half, and Oshkosh capital will absorb the remainder. A free site has been offered and arrangements made for the construction of a plant with a floor space of 80,000 sq. ft. A first year output of 3000 machines with a force of 750 to 800 workmen is planned.

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The project has been under consideration for more than three months, it is stated, but no public announcement has been made until now, when Oshkosh bankers and business men have been definitely assured of adequate financing.

# DELAWARE TRUCK BILL WOULD CHECK RATES

DOVER, DEL., March 14-There is pending before the Delaware legislature, now in session, a resolution the object of which is a nation-wide move to have State governments regulate motor truck freight rates. It was introduced a few days ago by Senator Bennett, who lives in the lower part of the state. After reciting the fact that every increase in railroad rates is likely to be followed by increased truck freight charges, it calls upon Governor Denney of Delaware to ask other governors to confer with him relative to the matter of having the states regulate rates.

The resolution has been referred to a committee, where it probably will lie until the time is considered ripe to bring it out and air it.

## Car Makers Increase Demand for Engines

MILWAUKEE, March 12—Schedules have been released by the Wisconsin Motor Mfg. Co., manufacturer of the Wisconsin engine, to the extent of 25 engines a day, which, although a small percentage of the capacity of the plant, indicates the gradual trend toward normal conditions. The Liberty Motor Car Co., Detroit, has asked for immediate shipments and has released a very substantial schedule for the next ninety days. In addition there have been numerous small requisitions which will go to make up a decided improvement in the total output.

H. W. Schnetzky, president, and A. F. Milbrath, secretary and chief engineer of the company, have returned from an extensive trip through the west, surveying business conditions in general and calling on Wisconsin distributors. They report the business outlook favorable. The Earl P. Cooper Co. at Los Angeles, and the Chandler-Hudson Co. at Seattle, are optimistic over conditions and state that the west coast is fast recovering from the business depression.

#### OHIO SENSES TRUCK DEMAND

COLUMBUS, March 11-Prospects for an active demand for motor trucks within a short time are unusually bright in Columbus and central Ohio territory, according to leading agencies. During the past few months it has been rather quiet and a canvass of the situation shows that many truck users will soon come into the market for replacement of their truck equipment. It has been the custom during the past six months for the truck owners and users to make all repairs on their present equipment to keep them going. Now the time has arrived when their old equipment is in many cases just about worn out and they will be forced into the market.

# Tractor Business Improves in South

Dealers Look to Normal Times for Restoration of Former Sales Volume

ATLANTA, March 14—Though it is the opinion among tractor distributers of the Atlanta territory that the crisis in this section has been passed so far as the tractor industry is concerned and that sales are experiencing a gradual improvement, the total volume of business is below the normal mark, and that condition appears likely to exist until the readjustment period has become a thing of the past.

One of the reasons distributers in this section are finding tractor sales rather few and far between is that many of the dealers, especially those in the smaller towns, have strained their credit almost to the breaking point. Fred Cameron, of the John Deere Plow Co.'s Atlanta branch, in a recent trip through south Georgia and the Carolinas, found that many of the smaller dealers were in

many of the smaller dealers were in severe straits. They were unable to make substantial payments on their accounts because they have not been selling enough tractors the past few months to even take care of incidental expenses.

Because of the declines in the prices of their products the farmers haven't the money with which to buy tractors now, and they are unable to obtain additional credit from their bankers in most cases because they are already under heavy obligations. This is the unfavorable condition against which the dealers are working in their efforts to sell tractors. Until that condition experiences material improvement the industry cannot get back to normal.

Cameron told of one dealer who started business a little over a year ago with \$2,500 capital, and who now owes \$37,500, with only \$15,000 worth of notes to take care of it. While that dealer's condition is not typical, there are many experiencing troubles of a kindred nature.

In January the tractor business in the Southeast was really at a standstill, but during February a few sales were made. March has been about on a par with February, but a gradual increase in business is noted and there is a better feeling than for several months. During April and May they are anticipating a much larger volume.

#### WHARTON TO MAKE FULL LINE

DALLAS, TEXAS, March 12—The manufacture of a very extensive line of automotive apparatus is contemplated by the recently organized Wharton Motors Co., Inc. The line comprises three passenger car models, a four, a six and an eight, two trucks, one of 1 to 1½ tons capacity and the other of 2 to 2½ tons, and a combined tractor and cultivator. The four-cylinder model has a 3½ x 5 in. engine, the six-cylinder model a 3½ x4½.

# Car Design Lowers Rates on Insurance

Standard Frame Marking Secures 20 Per Cent Allowance—Locks Reduce Risks

NEW YORK, March 14—The insurance committee of the N. A. C. C. of which W. E. Metzger is chairman, has sent a bulletin to its members pointing out that insurance costs to the public are influenced by car design and urging members to study the schedule of fire hazards. The bulletin says:

"A very substantial item of expense in connection with ownership and operation of an automobile is insurance. The effect of the new plan of grouping cars by name instead of by list price is becoming better known and appreciated by buyers, and our Directors and Insurance Committee strongly urge that members carefully note the construction features which Underwriters consider as bearing directly on the risk attached to the various forms of insurance, not only for the purpose of having each car grouped as favorably as possible but because makers should aim to keep insurance costs to the public as low as possible.

"These features are listed in the schedule of hazards. The Underwriters believe that by means of theft retardents and positive identification marks, manufacturers can assist in reducing insurance losses. For standard marking of frame they offer 7½ per cent, for standard marking of engine block, 7½ per cent, and an additional 5 per cent for both, making 20 per cent when both frame and engine block are so marked.

"Deductions ranging from 12½ per cent to 20 per cent are allowed for built-in, or integral, approved locking devices; the transmission type secures the greatest reduction. It will be noted that the Manual grants an allowance of 20 per cent from theft rate on Paige-Detroit cars. This is because of their built-in transmission lock. In most cities and territories a 15 per cent reduction is made in theft insurance when the car owner buys a lock of an approved type and attaches it to his car; in many cities, if a car is not equipped with an approved lock a flat extra charge of \$15 is made in the theft rate.

"Fire risk is influenced by location of gasoline tanks, their construction, the soundness of the feed system, proximity of carbureter to sparks, the tension and insulation of wiring, exposure of exhaust to drippings and general workmanship and stability."

#### STOCKHOLDERS RAISE \$25,000

AKRON, March 12—Stockholders of the defunct Interlocking Cord Tire Co. of Akron and Mogadore, now in the hands of Elihu Harpham as receiver, and whose four former main officers are under criminal indictment for alleged violation of the Ohio Blue Sky Law, have raised \$25,000 in an effort to reorganize and re-establish the company, it is announced by a special stockholders' committee. The committee also announces appointment of Edward R. Kohl as temporary president of the company, succeeding Walter Kline, who resigned following his indictment by the Summit County Grand Jury. R. E. Cartlidge, Akron industrial engineer, has been named treasurer of the new management of the company and C. A. Rukamp has been named secretary. The stockholders will elect a permanent president soon, it is announced.

## U. S. C. C. Favors Revision in Contract Obligations

WASHINGTON, March 10—Six months' study of cancellations in representative industries convinced the fabricated production department of the Chamber of Commerce of the United States that this general repudiation of business agreements was largely responsible for the economic disturbances. The National Chamber has recommended that the business interests of the country take steps to prevent the spread of cancellation evil and insure confidence in the written and oral contractual relations.

The Chamber favors revisions in contracts which make the obligations of both seller and buyer equitable with provisions for arbitration; diligent inquiry into credit standing of applicants, report cases where parties cancelled their contracts and establish a "Golden Rule" policy in business. The Chamber recommended that merchants use the services of trade organizations in combating cancellations.

## Germany to Open Gates to Light Tractor Test

DETROIT, March 14—Officials of the Ford Motor Co. are much gratified at the report from Berlin that the Reichstag committee on national economics has voted to recommend that the government permit the entry of four light weight American tractor plows for demonstration purposes. This action was taken in the face of strong opposition by German manufacturers.

It is the assumption here that the tractors in question are Fordsons. Negotiations for their entry into Germany have been pending since the visit here of B. F. Graetz several months ago. He expressed confidence that he would be able to get across the border several tractors which were furnished him. If the Reichstag adopts the recommendation of its committee it is believed it will presage the opening of an enormous new market for tractors.

#### POLICE GUARD TURIN PLANTS

NEW YORK, March 15—A dispatch from Turin, Italy, says the police have been stationed in the Michelin factories where the workers have been locked out. This action was taken because of acts of violence committed by the workers.

# Insurance Companies Drop Full Coverage

Aetna to Make Insured Bear Initial Losses in Collisions— Urge Co-operation

NEW YORK, March 14—An important step toward reducing the number of automobile accidents and toward lessening insurance collision rates has been taken by the Aetna Life Insurance Co. and its affiliated companies, the Aetna Casualty & Surety Co. and the Automobile Insurance Co. of Hartford, in eliminating the sale of full coverage collision insurance from March 9 on. Under the new plan only that form of collision insurance which provides for the insured paying the first \$50 or \$100 of each collision loss will be sold.

This action has been taken individually by the companies and is designed to throw the burden of careless and negligent motor car operation upon the operator. Insurance brokers and agents have been notified of the company's action and the reasons for it. Their support has been particularly sought in a movement to eliminate full collision coverage insurance in the Greater New York zone because of the heavy traffic.

By making this change company officials expect to accomplish something more effective and constructive in the way of reducing preventable insurance accidents than the mere action of increasing rates. Decreased losses will be reflected in decreased rates, so that the main benefit will be to the public.

As part of the Aetna's present move to reduce preventable losses, the company is also advocating the equipping of cars with approved types of locks to lessen the danger of theft.

## Safety Precautions to Win Lower Rates

MILWAUKEE, March 12—Wisconsin pioneered in workmen's compensation insurance covering accidents or fatalities, and since that time every manufacturer, or dealer, in any kind of industry or trade has paid the same premium rate for this state-enforced insurance as every other employer in his line.

Through the efforts of employers, including some of the automobile manufacturers, makers of parts and equipment and service plant owners, the Wisconsin law is now to be amended to give the employer who promotes safety in his establishment a lower premium rate and expense than the one who gives little or no attention to these items, regardless of class of enterprise.

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The bill will be passed by the Wisconsin legislature, at least in its chief essential, and it is predicted that the move here will be followed by the other states having similar state-enforced insurance.

The new statute provides for individual experience rating, per establishment.

# Industry Shows Gain While Others Slump

### Cleveland Survey Shows Falling Employment in Other Lines —Look for Fair Year

CLEVELAND, March 15—The automobile industry is moving back toward normal conditions much more rapidly than are other lines of industry in this city, according to a survey made by the Industrial Relations Committee of the Cleveland Chamber of Commerce. The survey was made for the United States Department of Labor and the results were sent to Washington. Each month a similar survey will be made and the figures given to Washington, so that the labor department may keep an accurate fine on developments here.

The report disclosed that there was an increase of 10 per cent in the number of employees in 18 plants engaged in making products for the automobile industry. In these 18 plants, 5542 men were employed on Jan. 31, while on the last day in February the number had increased to 6120. The plants in this group of 18 include all of the automobile making concerns in the city with the exception of one, as well as most of the factories in which automobile parts are

While the automotive industry was making this 10 per cent headway, other lines in the survey were going back 1.9 per cent from an employment standpoint. The committee sent out questionnaires to approximately 100 factories and 97 responded. In these 97 factories there were 58,116 men employed on the last day of January, while on Feb. 28, the number had decreased to 57,001. That is a loss of 1.9 per cent in the number of employees.

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Here is what the survey disclosed:

	No. of Employees	
Group-	Jan. 31	Feb. 28
Food	3,071	2,702
Textiles	5,928	6,045
Iron and steel	21,081	20,488
Lumber	1,119	1,163
Paper	1,170	1,100
Chemicals	3,242	3,141
Metal	869	747
Miscellaneous	16,088	15,495

At the automobile plants that were questioned it was brought out that orders were in February more than 10 per cent greater than they were in January, and this brought the prediction that more men would be employed in the present month. March has started off well.

Sixty per cent of the normal production or employment capacity of the 97 factories that responded in the survey is being used to-day, according to an estimate made at offices of the industrial relations committee. It is estimated that in normal times, the factories that were employing 57,001 persons on Feb. 28 would have on their payrolls approximately 100,000.

Predictions have been made that production for the year would be about 60 per cent of what it was in the boom days of the war.

## Parts Makers to Push Service Station Plan

NEW YORK, March 16 .- Representatives of some of the largest parts manufacturers in the country will meet here late this week for further discussion of the plan which has been in process of development for some time, for the establishment of major service stations and branches in all parts of the country. Better and more economical service for motor car owners by making constantly available to them complete stocks of major parts is the chief purpose of the plan. It is the purpose to carry at these stations the principal parts used in most of the assembled cars.

Many parts manufacturers are coming to the conclusion that if their products are to be properly serviced some such plan is necessary. It is not the purpose to come into competition with the dealer and garage men but rather to co-operate with them, except in the case of orphan cars and trucks. Supplies at these stations would be much more complete than any individual dealer could afford to handle.

## Harvester and Case Lower Tractor Prices

CHICAGO, March 17—In anticipation of lower production costs, the International Harvester Co. has made the following reduction in tractor prices: Titan 10-20, reduced \$200; International 8-16, reduced \$150; International 15-30, reduced \$350.

In addition, reductions ranging from 10 to 15 per cent of the wholesale price have been made on about one-third of the line of implements and machinery manufactured by this company.

A reduction of 15 per cent has been made by the J. I. Case Plow Works. This cut applies to all the products of this company, including tractors and other power farming machinery.

#### DORRIS PLANS EXPANSION

ST. LOUIS, March 16—At a special meeting called for March 21, stockholders of the Dorris Motor Car Co. will consider the proposition of forming a holding company to purchase all the property and improvements owned by the company, in this way permitting further manufacturing expansion by turning the fixed assets of the company into liquid assets. The company, according to its secretary, J. F. Culver, has been unable to expand and increase its output of cars to supply the demand on account of the lack of liquid capital. The holding company will be capitalized for at least \$250.000.

# Goodyear Meeting Is Again Deferred

### Stockholder Ratification of Financing Plan Held Over to March 22

AKRON, March 15-The meeting of stockholders of the Goodyear Tire & Rubber Co. adjourned to to-day from March 4, for the purpose of finally ratifying the company's refinancing program which involves a loan of \$85,000,000, was again adjourned to March 22 to-day upon request of special committees negotiating with creditors of the company. Announcement of the continued adjournment of the meeting came as a surprise to stockholders, as it had been announced officially by the company that stockholders proxies received showed more than a 75 per cent majority vote in favor of the refinancing and reorganization plans.

The eleventh hour hitch in proceedings leading to definite consummation of the refinancing program is said to have been with merchandise creditors. The special merchandise creditors committee has gained the assent of more than 80 per cent of merchandise creditors to the "plan of readjustment" included in the financing negotiations, but it is stated that practically unanimous assent of creditors is desired and is necessary. Creditors refusing to yield are holding out, it is said, in the hope that their claims will be settled either by Goodyear or by friendly interests.

Stadleman announced that progress was being made in winning over the merchandise creditors holding out, and that with continued gain of ground he expected that the stockholders meeting could be called soon.

# Fisk Resumes Schedule at Reduced Wage Rate

CHICOPEE, MASS., March 14—The Fisk Rubber Co., which has been operating on a three-day schedule since Dec. 1, to-day resumed full time and a wage reduction on both day and piece work was put into effect, which amounts to an average of 10 per cent. About 1600 employees are affected. Increased overhead expenses under the shortened schedule makes the return to full time and wage reduction necessary, the company states.

#### RECEIVER NAMED FOR SUPREME

AKRON, March 12—Scott Kenfield, former Akron city solicitor, has been named receiver of the Supreme Cord Tire & Rubber Co. of Akron, on petition of Julia Nunamaker and A. C. Bender, representing the estate of Jefferson Nunamaker. The charge is made by the petitioning stockholders that the company's former fiscal agent absconded with \$10,000 paid by the Nunamaker estate for 100 shares of stock, which, it is claimed, were never delivered. It is also charged that the firm is insolvent.

# Studebaker Demand in Excess of 1920

## Erskine Looks for New Production Mark—Earnings of \$9,822,854 Reported

SOUTH BEND, IND., March 16-"If general conditions become no worse than they are now our business should almost certainly exceed that of last year," was the assertion made by A. R. Erskine, president of the Studebaker Corp. in presenting the annual report to the stockholders to-day. The report shows net profits of \$9,822,054 after deductions of Federal taxes, depreciation and other fixed charges. This was equivalent to \$15.18 a share on the \$60,000,000 of common stock compared with \$20.69 a share on the \$45,000,000 of common stock outstanding at the close of 1919. Gross sales for 1920 exceeded any other year in the history of the company, having been \$90,652,362, compared with \$66,383,-307 of 1919.

The income accounts for 1920 and 1919

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1920	1919
Net sales\$90,652,362	\$66,383,307
Manuf. cost, depr., etc. 78,521,555	55,099,844
Operating profit\$12,130,807	\$11,283,463
Other income 120,014	
Total income\$12,250,821	\$11,283,463
Interest, etc	116,951
Federal taxes 2,428,767	1,854,229
Net profits \$9,822,054	\$9,312,283
Preferred dividends 710,150	748,475
Common dividends 3,937,500	2,100,000
Surplus \$5,174,404	\$6,463,808
Profit and loss surp *\$13,467,047	\$20,925,533

\*After deduction of \$15,000,000 stock dividend, \$872,940 net losses actually sustained in 1920 or anticipated in completing final liquidation of wagon business, etc.

In his statement concerning the outlook for 1921, President Erskine said:

"The demand for Studebaker cars is quite heavy from all sections of the country, except in a few spots, and in a number of places is double and treble what it was last spring. March sales will probably exceed 5000 cars. Manufacturing schedules call for 5235 cars in March, 5440 in April, 7015 in May, and 7320 in June, with production proceeding nicely and under economic conditions."

# Develop Scoutomobile Weighing 150 Pounds

BOSTON, March 14—A striking curiosity, a two passenger automobile said to weigh less than 150 lbs., has been developed by C. H. Martin of the Martin Rocking Fifth Wheel Co. in conjunction with C. R. Gurney, consulting engineer. The machine is claimed to have a maximum speed of 30 m.p.h. and to travel 75 miles on a gallon of gasoline. It seats two people side by side and can be completely housed in for protection in bad weather. There is a single front steering wheel which tracks with one of the rear wheels.

The car is made largely of aluminum-

alloy and magnesium metal; it has a 5 h.p. opposed motor and sliding gear transmission, but no universal joints or differential. The wheel arrangement and spring suspension are said to be such that it will ride comfortably. One of the advantages claimed is that the car can be pushed through an ordinary doorway and stored in the front hall or office.

Martin says: "The machine will not be ready for the market for some time, but we are inviting criticism and suggestions from dealers and users. Before offering it to the public we propose subjecting it to months of tests. The selling price has not yet been fixed, but in view of the high priced light alloys extensively used in its construction it probably will be the highest priced automobile for its weight in the country."

# Ford Is Operating on Own Resources

(Continued from page 624)

be possible, though there may be some banks unable to continue the loan and there may be others, which for various reasons, will refuse this sixth renewal. The personal taxes of Henry and Edsel Ford are declared to be negligible when taken in comparison with the other indebtedness.

The banking syndicate's representative at the meeting with the Fords and Alfred Lucking, the Ford attorney, expressed the sincere hope that the company would be able to weather the storm without financial help for the good effect it would have on the industry insofar as the attitude of the public is concerned. It was stated by the bank's representative that the depression had given rise in the public mind to a feeling that the automobile industry had gone to smash.

This naturally was accentuated by the reports that the Ford company was in financial straits. Successful operation of the big organization without help would be the best tonic that could be given the industry, it was urged. The New York bankers naturally are heavily involved in automobile financing and their representative stated frankly that they would be gratified if Ford could operate successfully on his own hook for the stimulus afforded the industry as a whole.

#### GIRL RE-ELECTED C. G. HEAD

KALAMAZOO, MICH., March 12—The first annual meeting of the C. G. Spring Co., held Friday, March 11, resulted in the re-election of Christian Girl as president for the ensuing year. J. G. Utz, consulting engineer of Detroit, was named as vice-president. Judson Clary is secretary and Charles Gettler, treasurer. These four and Fred R. Eaton comprise the board of directors.

The plant in Kalamazoo is operating on about 40 to 50 per cent basis. Two service stations, one in Chicago, the other in Detroit, have been established. C. C. Homan, one-time purchasing agent for Willys-Overland, is in charge of the Chicago branch.

# Legislative Season Brings Many Bills

### Revisions Upward in Licenses to Meet Road Costs Major Part of Burden

NEW YORK, March 15—Automobile legislation which has been introduced in the 40 State legislatures which began their sessions early this year is being sorted out and assimilated. Thirteen of the legislatures already have adjourned. It is estimated that approximately 1500 bills have been introduced in the 40 States. Almost the same number were introduced last year in less than half as many States.

Increases in registration fees have been proposed in 34 States. Generally speaking, they apply to commercial vehicles rather than passenger cars. In most States these fees are used for the maintenance of highways, but in a few cases it is proposed to expend them for actual building of roads. The increases proposed vary widely, but the industry has been gratified to note that in several States they follow closely the tax suggested in the proposed uniform motor vehicle law. Automotive interests are not disposed to combat seriously what they consider a reasonable increase on the theory that, while they will benefit directly through improved highways, all the taxpayers in the State will benefit indirectly. It is significant of the trend of legislation, however, that there is a tendency to increase fees each year.

Other subjects dealt with most generally in proposed legislation are size, weight and speed restrictions, obligatory equipment, indemnity bonds as a prerequisite to registration, stoppage at grade crossings, licensing of automobile mechanics, the classification of freight and passenger carrying motor lines as common carriers, and a tax on the consumption of gasoline.

As a general rule, gasoline taxes, indemnity bonds and grade crossing stops are not meeting with general favor. Gasoline taxes were proposed in 12 States, but already have been killed in four or five and have not much chance of passage in the others.

Measures providing for indemnity bonds have been introduced in 15 States, but have been killed in several and are making little progress in the others. Measures for the licensing of automobile mechanics have been introduced in 10 States, but have been killed in four.

## TRAFFIC MANAGER KILLED

DETROIT, March 16—Roger Hurley, traffic manager of the Maxwell plant of the Maxwell-Chalmers Co., killed himself accidentally yesterday while examining the revolver of an acquaintance. Hurley was 46 years old. He was widely known as a traffic man, having been general agent of the Michigan Central and Cloverleaf railroads before he joined the Maxwell organization three years ago.

# **Congress Prepares to Halt Dumping**

# Tariff to Equalize Price Differences

Leaders Agreed on Tentative Program—Will Fix Duties by Valuation Here

WASHINGTON, March 16—Congressional leaders have adopted a tentative legislative program for the extra session which will include enactment of an antidumping bill with teeth in it. It will be designed to prevent unfair competition by foreigners and undoubtedly will be so phrased that it will put a serious crimp in the plans of Europeans who have proposed to sell in the American market many millions of dollars worth of American made motor vehicles and automotive equipment.

This material was sold by the War Department to the British and French governments with the understanding that it would not be sent back to the United States but it has since been sold to private individuals who propose to take advantage of the present laws and reimport it, duty free, to undersell the American market.

France alone has \$65,000,000 worth of these materials. The Slough Trading Co. of England owns 10,000 American made motor vehicles and has begun their importation into this country. The Keystone Tire & Rubber Co. has bought up nearly all the American army tires in France. A French company also is shipping back American made trucks to be sold at auction. A Portuguese merchant has an option on \$50,000,000 worth of automobile parts and accessories.

#### Leaders Committed to Action

The anti-dumping law which it is proposed to enact would at least require payment of duty on the difference between the purchase price of this material abroad and the market price in this country. Senator Penrose, and Chairman Fordney of the House Ways and Means Committee, already have committed themselves to such a measure.

The effects of the dumping law already have been discussed in Automotive Industries which was informed two weeks ago by Senator Smoot that the bill passed by the House at the first session of the last Congress and amended materially in the Senate would cover the reimportation of motor vehicles.

Congressional leaders had little knowledge of the menace to American industry involved in the reimportation evil until their attention was called to it by the Washington bureau of the Class Journal Co. They grasped the situation quickly and their attitude has been entirely sympathetic.

While the anti-dumping bill may be re-introduced in its present form, several Senators and representatives stand ready to offer amendments from the floor. Senator Smoot believes it is essential to stop reimportations at prices less than production costs. It is possible the bill may specifically cover surplus army stocks sold abroad.

#### Amendment Adds Teeth

Senator Penrose and Chairman Fordney of the House Ways and Means committee will supplement the measure with an amendment to the tariff law assessing customs at American valuation. Effect of the revision of assessment policies as proposed by Senator Penrose upon the automotive industry is easily noted. For instance, it is reported by the Federal Trade Commission in its report on farm implement trade, that mail order houses have been selling spare parts for automotive products at prices which defy dealer competition.

It is known that certain large mail order houses have their agents operating among foreign manufacturers. These American importers find it possible to obtain prices which, with ocean-freight and duty added, remain below production costs here. The valuation is made at port of shipment and the customs officials abroad have little chance to contest the figures as the manufacturers would have their instructions in this respect. With American valuation restored to the books, importers would be assessed on the wholesale prices of the goods in this country instead of abroad.

A committee comprised of C. C. Hanch, vice-president of the N. A. C. C. and chairman of the taxation committee; R. A. Branigan, counsel, and Pyke Johnson, manager of the Washington office, conferred with legislative leaders here this week on the taxation question. They found a sharp division of opinion as to tax proposals and much uncertainty as to what plan should be considered first.

The committee ascertained that State officials had advised their congressional representatives to consider the effect that a national levy on automobiles would have on State revenues and highway programs. With the various States insisting on State rights and jealously guarding their sources of revenue, it is expected that the Houston proposals for a horse-power tax on automobiles will meet strong opposition in Congress.

#### May Try Canadian Tax Plan

Few legislators would commit themselves to the proposed increase in excise taxes. Senate and House committee leaders are split over the sales tax levy. The Hanch committee was advised that the Canadian two-point tax, which hit the manufacturer and wholesaler, was under consideration.

# Washington Amused at Barrett Attack

Farmer Representative's Charges of "Assistant Government" Fall Short of Mark

WASHINGTON, March 15—Official Washington evinced little surprise at the attack of Charles S. Barrett, president of the National Farmers' Union, against local representatives of the National Automobile Chamber of Commerce, the American Automobile Association and other large organizations. The contention that these representatives were "a new and powerful 'assistant' government" fell short of its mark because Barrett has been haled before special committees of Congress investigating the activities of professional farmer-lobbyists.

Barrett did not give details as to the activities of the Washington office of the N. A. C. C. though he did cite the real achievements of the A. A. A. He contended that "automobile owners have not neglected an opportunity to assist the government in making laws which are designed to make more pleasant and perhaps more profitable, the business in which they are engaged. Under the name of the American Automobile Association, the owners have established themselves in a big office building and have placed A. G. Batchelder, a former newspaper man, in charge. This organization was largely instrumental in securing the passage of the bill providing for Federal aid in road building and many hundreds of millions of dollars have already been expended for this

#### No Pleaders for Industry

Batchelder, executive secretary of the A. A. A., like all other individuals mentioned by Barrett declined to take him seriously. He pointed out that in the promotion of good roads and Federal aid the farmer had been the greatest beneficiary.

Pyke Johnson of the N. A. C. C. explained that Barrett had been misinformed as the Washington office was purely an information bureau maintained for the automotive industry. He declared that no special pleaders were employed and that legislative committees selected from the membership spoke for the industry and not salaried men.

Senators and Congressmen who have investigated have found that the entire membership of the National Board of Farm Organizations, represents less than one per cent of the registered farmers, yet presume to speak for the agricultural industry.

# Larsen Plane Tests Show Instability

#### Army Air Service Condemns Control and Pilot's Seat— Fire Hazards Eliminated

WASHINGTON, March 11—Summary of results of the official performance tests conducted by the Army Air Service with Junker airplanes sheds light on the numerous and baffling accidents which resulted in casualties to air mail pilots. The reports submitted to-day after a series of flights show that the airplane is spirally unstable, due to the large fin area toward the tail, causing a lifting of the rear of the fuselage in the event of a side slip.

The pilots reported that the flying qualities of the Junker planes appear new and different when originally flown by pilots familiar with conventional types. The rudder and elevator of the JL planes appear and feel too small. The Army test pilots agree in part with the Post Office Department as to the fact that the JL planes are economical and efficient and have features of construction having valuable possibilities.

The aviators have little criticism to offer for the engine, but the arrangement of the controls and pilot's seat are condemned. The pilots suggested the abolishment of the notched push-rod type of throttle and the substitution of a standard engine throttle. The oiling system is regarded as adequate, but the shutter control works poorly. The Army test pilots eliminated fire hazards to a large extent by installing air intake pipes leading from the tank under the crankcase to the outside of the plane below the engine, thus directing backfires outside the fuselage.

The airplane tested was of the commercial type with an engine developing 1445 r.p.m. on a mixture of half benzol and half gasoline. The Postal Service has suspended use of these planes pending further tests.

## Canada Plane Barrier to Be Effective May 1

NEW YORK, March 12—The Manufacturers' Aircraft Association has been informed that the Canadian Air Board has set May 1 as the time limit in which American army and navy pilots may fly over Dominion territory. Civilian aircraft and pilots from the United States are barred. The action was taken under the terms of the International Air Convention, which provides that pilots of aircraft entering other countries must be registered and licensed in their own country.

All the powers have subscribed to the convention, including the United States, and all governments excepting that of the United States have established departments with jurisdiction over aviation. At the request of the American State Department the Canadian author-

ities permitted army and navy fliers to enter Federal machines on official business only "pending the organizing of a body in the United States having authority to issue civilian aviation certificates and licenses in accordance wth the internatonal air convention." It evidently is the expectation that such a body will be created before May 1.

## Higher Operating Cost Causes Goodrich Deficit

NEW YORK, March 15—Despite sales by the B. F. Goodrich Co. for 1920 of \$150,007,345, a new high record, there was a deficit of \$921,248 before payment of taxes, inventory depreciation and dividends. After payment of dividends on the common and preferred stock the deficit was \$5,371,792, compared with a surplus after dividends of \$12.657.813 in 1919.

A comparison of the income account for 1920 and 1919 follows:

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	1920	1919
Net sales\$	150,007,345	\$141,343,419
Mfg. expenses, etc	142,250,719	121,579,265
Balance	7,756,626	19,764,154
Total income	8,732,972	20,340,214
Depreciation, etc	6,021,686	3,035,401
Net profits	2,711,286	17,304,813
Preferred dividends.	2,688,840	2,247,000
Balance	22,446	15,057,813
Common dividends.	3,604,200	2,400,000
Deficit	3,581,754	*12,657,813
Prev. suradj	41,203,046	33,894,923
Total surplus	37,621,292	46,552,736
Final surplus after reserve, etc	22,706,498	41,203,046

\*Surplus.

B. G. Worth, president of the com-

pany, in his remarks to stockholders, said in part:

"In view of the decline in the market values of crude rubber and fabrics, directors have deemed it advisable to appropriate out of surplus the sum of \$8,000,000 which added to the reserve for contingencies of \$2,000,000 provided out of profits in prior years, leaves a total reserve on Dec. 31, 1920, of \$10,000,000 to cover possible losses on future commitments and contingencies

"Directors feel that, taking into consideration the depression in the rubber industry during the last half of 1920, operating results shown are satisfactory and the financial position is excellent.

"Plants are in a thoroughly efficient working condition, prepared for any emergency, and it should therefore not be necessary to incur any further expenditures during current year for additional expansion of fixed properties."

#### FORM NEW FINANCE COMPANY

OTTAWA, March 12—The Canadian Metropolitan Securities Corp. has been formed with a capital of \$1,250,000 divided into \$500,000 8 per cent preference cumulative shares and \$750,000 common shares, both \$10 par value. The new company will act in connection with the Confederative Investment Corp., Ltd., the latter being fiscal agents for the new company. The Ritter Commercial Trust of Cleveland has guaranteed the preferred dividend for ten years.

# Modified Contract Urged in Georgia

### Dealers Solidify Sentiment Looking Toward More Equitable Terms From Factory

ATLANTA, March 14—Contending that the contracts under which the dealers operate are arbitrary with regard to the rights of manufacturers, but that they show slight regard for the interests of the dealers, the Georgia Automotive Dealers' Association has inaugurated an intensive campaign that has as its objective an improvement in this condition of affairs. The association is co-operating with the national organization in this movement.

Within the past month four sectional meetings have been held in various parts of the State, together with a meeting of the State body in Atlanta, March 10, at which time the contract matter was thoroughly discussed and resolutions adopted advocating the five important items as objectives in the national campaign. These items are outlined as follows:

First: For the automatic renewal of contracts on the basis of fair and faithful representation of the manufacturers by the dealers.

Second: For contracts binding both parties whether the manufacturers be one of the parties directly participating or through distribution.

Third: For the termination and cancellation of contracts upon a just cause only.

Fourth: For concession of the right to the dealer to order and receive automobiles as he needs them only and to refuse acceptance of all automobiles not so ordered by him.

Fifth: For cessation of contract deposits required of dealers by manufacturers.

An increase in the discounts now allowed dealers by the manufacturers was also advocated at the various sectional meetings and at the State meeting in Atlanta.

# Liberty and Chandler to Finance Dealers

NEW YORK, March 15—To a greater extent than ever before motor car manufacturers are having impressed upon them the necessity of financing their dealers, especially in the smaller towns, either directly or through automobile financing companies. The list of those which have undertaken this work is steadily expanding.

Among the latest to go into this field is the Liberty Motor Car Co. of Detroit, which has begun the financing of its dealers on what is known as the floor

plan

The Chandler Motor Car Co. recently entered into an agreement with the Continental Guaranty Co. of Chicago to finance its dealers and a similar arrangement was made several months ago by Dodge Bros. with the Bankers Commercial Security Co. of this city.

The Maxwell Motors Co. has been financing dealers for two or three months

### INDUSTRIAL NOTES

Times Square Auto Supply Co., Inc., will change its name to Consolidated Distributors. Inc.

Gardiner Motor Co. has re-elected all directors and officers at the annual stockholder and organization meetings.

Deere & Co. has reduced production in its wagon factory in Moline, Ill., because of stagnant buying tendencies.

Chappelow Advertising Co. has leased 10,000 feet of floor space for the location of a modern advertising office in St. Louis.

Masters Motors Co. has moved its Indianapolis plant and office equipment to Lafayette, Ind., where it will combine its forces.

Green Bay Drive Calk Co., Green Bay, Wis., has started work on a forge shop and storage building to replace buildings destroyed by fire.

Kelly-Springfield Tire Co. has re-elected all retiring stockholders, with the exception of Van H. Cartmell, who is succeeded by Theodore G. Smith, a vice-president of the Central Union Trust Co.

Standley Skid Chain Co. has made arrangements with Mattauch & Strong Co. of Des Moines for the manufacture and marketing of the Strong transmission band adjuster.

## Skelton Motors Name Changed by New Owner

ST. LOUIS, March 12—W. F. Traves, head of the Talbott Reel Mfg. Co. and an official of the American Knockdown Bottle Case Co., Kansas City companies, has taken over the interests in the Skelton Motors Corp. which he purchased from Dr. L. S. Skelton shortly before the latter's death.

The general offices of the Skelton company have been moved so that they now share quarters with the Premier distributor, and the Murphy Machinery & Equipment Co. Both retail and wholesale work will be done there. The name of the producing company has been changed to the Traves Motors Co., Successor to the Skelton Motors Corp.

Mr. Traves states that the former officials will be retained including W. A. Chapman, general manager; J. A. Schroeder, chief engineer; and George Sherwood, production manager. The name of the product, Skelton, will be retained for the present.

## Wharton Motors Builds Combination Tractor

DALLAS, TEXAS, March 11—A two plow tractor that can also be used as a cultivator and which is to sell at about \$1800 is being manufactured by the Wharton Motor Co., Inc., of this city. The outstanding feature of the machine is that it is a three-wheel type with drive on all wheels. The tractor has a rating of 12-20 h.p. and is equipped with a four cylinder Gray engine of 3% in. bore by 5 in. stroke, running at 1000 r.p.m. Lubrication is by a gear pump and ignition by an Eisemann Magneto. The carburetor is a Kingston 1½ in. Gasoline is recommended for fuel but kerosene can

be used. The fuel tank has two compartments, of 15 and 3 gal. capacity, respectively. The cooling water is circulated by pump and a fan is mounted back of the radiator.

The belt pulley measures 10 in. in diameter by 7 in. face and its shaft is mounted on roller bearings. The clutch is a Borg & Beck, while the transmission is of the Wharton Company's own design and manufacture. Three forward speeds are obtained, the reductions being 152, 109 and 77 to 1, respectively. The three speeds given by the above reduction ratios in combination with the 60 in. driving wheels are 11/2, 21/2 and 4 m.p.h. respectively. The final drive is through worm and wheel and bull gear and pinion. This tractor has a wheelbase of 82 in. and turns in a 7 ft. radius Its minimum clearance is 24 in. and its total weight, dry, 3800 lb. The rear driving wheels are adjustable on the axle, which enables the operator to cultivate rows of any spacing from 30 to 48 in.

## G. M. C. Directors Board to Act on Dividends

NEW YORK, March 16—Directors of the General Motors Corp. are expected to take dividend action the latter part of this month. There is no intimation whether or not the dividend will be paid but it is expected to depend largely on the showing made in the next two weeks. If there are indications that the present upward trend in business will continue permanently the payment probably will be made.

It is not probable immediate action will be taken by the corporation on the proposal to fund its bank loans of approximately \$75,000,000 through the issuance of new securities although the plan has not been abandoned definitely. The position of the company has been materially improved by the large reduction made in its inventory. It can be stated positively that no large additions or improvements to any of the General Motors plants are contemplated.

## Renard, Ballot Driver, Killed in Collision

PARIS, Feb. 27-(Special Correspondence) - Fernand Renard, Ballot race driver, and mechanician to René Thomas in the last Indianapolis race, was killed instantly to-day when he collided with an automobile truck in the suburbs of Paris. Renard, who was entered to drive a Ballot car in the next French Grand Prix, was carrying out carburetor tests in company with the chief engineer of the Zenith Carbureter Company when the driver of the truck suddenly swung across the road. The racing car was little damaged, but Renard struck his head against the body overhang of the truck and was decapitated.

#### BRIDGEPORT RECEIVER NAMED

BRIDGEPORT, CONN., March 16— Edward K. Nickolson has been appointed receiver for the Bridgeport Motor Truck Co. His bond has been fixed at \$25,000.

### METAL MARKETS

WHATEVER improvement is making itself felt in the automotive industries is eagerly seized upon to generate a more optimistic atmosphere in the iron and steel markets. A Cincinnati pig iron interest, whose market letters since the beginning of the year have been dyed in the most sombre hue of unrestrained pessimism, says in its report for this week:

"It is especially encouraging to realize that a revival in the automobile industry is apparent. Several well-known manufacturers of passenger cars in Michigan have resumed operations. Some are back to 50 per cent of their normal output. The cars have been sold and are being shipped out as made. This allows the foundrymen to liquidate stocks of castings which have been held in storage for many months, and in turn affords them the opportunity to specify more liberally for shipments against their contracts for pig iron and coke. Thus blast furnaces will be given some relief from the heavy burdens they are carrying for the benefit of their customers."

The steel market may be said to have entered upon a new phase. Heretofore we have had steady declines in the prices named by "independents," whereas now we unprecedented irregularity in quotations, some of the producers, convinced that the tide has turned, being unwilling to cut prices further, while others appear to be anxious for every ton of steel they can get on their order books. The latter incline to the belief that, when Judge Gary returns from his vacation, which will be next month, the Corporation's price policy will undergo readjustment. By that time, it is expected, the preliminaries for changing from the twelve-hour to the eight-hour day in the Corporation's mills will be out of the way, and it will be seen whether, as a result of this rearrangement, it will be possible to avoid complications with labor and at the same time readjust production costs on a lower level.

In the non-ferrous metals, of chief concern to the automotive industries, the outstanding feature is that aluminum prices are expected to reflect more and more from now on the growing certainty of the passage of an emergency tariff measure.

Pig Iron.—Although occasionally transactions in resale iron would make it appear as though the market was still on the toboggan, automotive castings manufacturers are specifying much more freely against old contracts, and, with merchant furnace output at the lowest in many years, the supply of bargains is likely to lessen.

Steel.—Mills catering especially to the automotive trade, such as those specializing in cold-rolled strip steel and cold-finished steel bars, report more activity all around. Releases against old orders are gratifying and new inquiries and orders on the increase. New price levels, however, are still in a formative stage and await the placing of more representative business. Cold-finished bars will likely sell at 3c. Finished sheets for automobile use have been selling at 5.85c. So far as can be learned, the 1000-ton sheet order which a Detroit automotive interest is asking bids on has not yet been placed. No. 28 black sheets have been sold at as low as 3.85c. by Valley mills, although the sheet market generally is at 3c.

Aluminum.—One- or two-passenger car builders have begun to sound the market. The sole American producer continues to quote 28.50c. for virgin ingots. Importers are somewhat firmer in their price views.

## FINANCIAL NOTES

Lee Tire & Rubber Co. reports net profits, after all charges and Federal taxes, of \$326.-638 for the year ended December 31. This is equivalent to \$2.11 a share earned on the 150,000 shares of common stock of no par value, and compares with \$471,805, or \$3.14 a share, earned in the preceding year. Assets of the company totaled \$5,934,118, of which \$362,123 is cash and \$3,101,870 inventories. The surplus of the company is shown as \$662,335.

International Motor Co.'s report for 1920 shows gross sales of \$34,071,365 and net profits of \$4,583,151 before write-off for inventory depreciation. After inventory deduction and tax reserves the profit available for dividends is \$2,644,013, equal to \$5.32 a share on the common stock. The regular quarterly dividends of 1% per cent on preferred stocks will be paid April 1.

Peerless Truck & Motor Corp., for the year ended Dec. 31, shows net profits of \$1,063,306 after all charges, including Federal taxes. This is equal to \$5.31 a share on the 200,000 shares of common stock (par \$50) outstanding. In 1919 the company earned \$872,154, or \$4.36 a share. Net sales for 1920 were \$14,919,065, compared with \$12,928,601 in 1919.

Republic Rubber Corp. is negotiating for additional funds, and for that reason has deferred the presentation of its annual report. The annual meeting of the company has been postponed until April 14, at which time stockholders will be asked to approve financing plans arranged.

Stewart-Warner Speedometer Corp. reports net income for 1920 as \$3,092,383, which compares with \$3,161,634 in 1919. Surplus after dividends for 1920 is \$615,928, which compares with \$1,063,575 in 1919. The profit and loss surplus totals \$8,041,938, as compared with \$7,514,455.

Simms Magneto Co. reports net income for 1920 as \$71,661. This compares with \$94,998 earned in 1919 and \$74,414 in 1918. The balance after deductions for preferred dividends was \$1.661, as compared with \$22,748 in 1919.

Badger Foundry Co. of Racine, Wis., which specializes in automotive and agricultural implement castings, has increased its capital stock from \$100,000 to \$200,000 to handle a larger volume of business.

Auto Body Co., in a balance sheet as of Dec. 31, shows total assets of \$2,674,906, of which \$32,863 is cash and \$1,232,648 inventories. The surplus is \$48.035.

Mason Tire & Rubber Co. reports a 10 per cent increase in sales for February, 1921, over the same month 1920. The entire plant is again on a 24-hour basis.

Hupp Motor Car Corp. will pay a quarterly dividend of 1% per cent on the 7 per cent cumulative preferred stock on April 1.

Gardner Motor Co., Inc., has had listed on the Boston Stock Exchange 155,000 shares of no par common stock.

Timken-Detroit Axle Co. has passed its common dividend, due March 15, to conserve its cash resources.

#### PATTERSON EXTENDS HOLDINGS

GRAND RAPIDS, MICH., March 16— E. C. Patterson, president of the Patterson-Warner Co. of Chicago, has acquired a substantial interest in the Auto Indicator Co. of this city, and has been made one of the directors in the company. The Chicago company was organized four years ago by Patterson and A. P. Warner of Beloit, Wis., originator of the Warner speedometer, to manufacture and sell the Warner-Lenz.

The capital stock has been increased to \$1,500,000, which will provide for the company being financed on a basis to handle the increased business of the company resulting from the sales and advertising policies shortly to be put into effect. The board of directors has been increased to seven, the additional member being C. B. Hamilton of the Brearly-Hamilton Co. of this city. The present officers of the company are Joseph Renihen, president; R. W. Brown, vice-president and V. I. Gilley, secretary-treasurer.

# Immel Reorganization Approved by Creditors

COLUMBUS, March 12—The preferred stockholders' committee of the Immel Co., of Columbus, makers of closed automobile bodies, which has been in the hands of a receiver for several months, has prepared a plan of reorganization which is receiving the sanction of the creditors. The creditors hold claims of approximately \$450,000 against the company. It is proposed to organize a new company and purchase the property, including the plant, and pay 50 per cent of the claims in cash, giving first mortgage notes bearing 8 per cent interest for the remainder of the claims.

It is proposed to issue \$250 000 second mortgage 8 per cent notes, payable in three years, to furnish capital for operation. All preferred stockholders are asked to agree to the plan and aid in the reorganization which will maintain the plant as a going concern. Replies received both from preferred stockholders and creditors show that the plan is being approved generally.

#### CLEVELAND RE-ELECTS OFFICERS

CLEVELAND, Mar. 13-At the annual meeting of the Cleveland Automobile Co. the same board and officers were re-elected, as follows: F. C. Chandler, chairman of the executive committee; Samuel Regar, chairman of the finance committee; J. V. Whitbeck, president; Sid Black, vice-president; J. I. Krall, secretary and treasurer. Although no statement was given out, Krall said profits for the first full year were satisfactory from the time operations started in August, 1919, up to Dec. 31, 1920. The company has manufactured 19,000 cars, of which 16,000 were made during 1920. Present production is rather light, but it was stated that it is the aim of the company to resume normal production in a few months. Last August the company retired 5 per cent of its \$1,400,000 8 per cent preferred stock.

#### NEW BRITAIN ON FULL WEEK

NEW BRITAIN, CONN., March 15— The New Britain Machine Co. is now operating the tractor division on a 55hour week schedule. Indications point to an early increase in the working force and overtime operation in order to meet the production requirements.

### **Bank Credits**

Written exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Co., second largest bank in America.

NEW YORK, March 17—In spite of the fact that March 15 is one of the biggest days in the routine of the United States Treasury, the shifting of funds incident thereto had little outstanding effect on the money and security markets last week. On that date about \$500,000,000 of certificates of indebtedness matured, and there was due \$76,000,000 interest on the Third Liberty Loan, and, in addition, there will be payments of \$200,000,000 due the railroads at about the same time, under the provisions of the Winslow Act.

Moreover, the Treasury has announced the issuance of approximately \$400,000,000 of new certificates of indebtedness at rates fractionally lower than has been the case in the recent past. It had been variously estimated that the tax receipts on that date would amount to from \$300,000,000 to \$700,000,000, the new Secretary of the Treasury's estimate being near the maximum. The only assured thing about the tax receipts is, however, that they will undoubtedly be much smaller than for the corresponding date a year ago.

There was a slightly firmer tone in the local money market last week. Offerings of call money were fewer, at rates ranging from 6 per cent to 7 per cent, and with a ruling rate of 7 per cent. Time money, the greatest demand for which was for the shorter maturities, advanced to 7 per cent for sixty and ninety days, and four months' paper, and 6% per cent to 7 per cent for five and six months' paper.

The Federal Reserve System continued the improvement of its position which has, with only one interruption, steadily become stronger all the year. The same factors which have been chiefly responsible for the improved reserve ratio again were the main elements in the betterment in the past week; that is, gold reserves increased \$24,816,000, and the Federal Reserve notes in circulation decreased \$36,771,000. In spite of an increase in net deposits of \$68,392,000, and substantial increases in total earning assets and total bills hand, the ratio of gold reserves to Federal Reserve notes in circulation, after setting aside 35 per cent against net deposits, increased from 59.3 per cent to 59.9 per cent.

#### GRIGGS SELLS TRAILER STOCK

DETROIT, March 16—J. B. Mansfield heads a syndicate which has purchased a controlling interest in the Detroit Trailer Co. from S. A. Griggs. Plans are announced for an addition to the plant, 55 x 135 ft., which will be completed May 1. The new structure will house show rooms and finished stock. At the annual meeting, Mansfield was elected president; Griggs, vice-president; E. B. Newton, treasurer, and F. L. Tully, secretary.

# Men of the Industry

David F. Edwards, formerly assistant general manager of the Chrysler plant of the Willys Corp. at Elizabeth, N. J., has been elected vice-president and treasurer of the LaFayette Motors Co. at Indianapolis. Edwards, who was graduated from Harvard, became an instructor in the Graduate School of Business Administration at Harvard University, specializing in industrial organization. In 1911 he came to Detroit as one of two assistants to the president of General Motors and became comptroller and later vice-president of Olds Motor Works at Lan-Leaving the Olds organization, he joined the Gier Pressed Steel Co. of Lansing and remained with that concern until joining the Willys organization.

R. W. Schuette, for many years Rolls-Royce distributor for the United States and of late New York branch manager, has resigned with the object of taking an extended trip through Europe, to be gone several months. J. S. Inskip, formerly of the sales department of the New York branch, Locomobile company, has been appointed New York manager, succeeding Schuette. J. Roy Hiltz, for a number of years with the Locomobile and recently with Hare's Motors of New England, has resigned and accepted a position on special sales work, making his headquarters at the American Works, Spring-field

Sir Dugald Clerk, the noted British gas engine expert, will come to this country in May and will deliver an address on, "The Internal Combustion Engine for Motor Cars," before the Society of Automotive Engineers at its summer meeting. Sir Dugald has long taken an interest in gas matters, and will discuss matters of thermal efficiency with leading American gas engineers. He is also chairman of the Conjoint Board of the Scientific Societies' Committee on Water Power in the British Empire and will look up matters connected with the water powers of the United States and Canada.

Fred P. Steele, for many years associated with the automobile industry, has joined the Stutz Motor Car Co. of America, Inc., and will represent the factory in the Atlantic Coast district. Homer R. Horsfall, formerly identified with the automobile business in St. Louis and for the past five years with the Overland, is now connected with the Stutz Motor Car Co. of America, Inc., with sales supervision over the Western and Pacific Coast territories. Fred Wilson is now located with the Stutz Motor Car Co. of America, Inc., in the capacity of assistant sales manager.

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H. Y. Grassi has been appointed director of service of the Republic Truck Sales Corp. and will be in charge of the company's comprehensive system. He has been connected with the service department of the Republic company and supervised the installation of standard service records. Practically all of Grassi's business career has been devoted to the mechanical and engineering field. Before joining the Republic organization, he was with the Master Truck Co. for two years and supervised the production of its first truck model.

George E. Bruner, manager of the service department of the Goodyear Tire & Rubber Co., has been announced as successor to Robert S. Wilson as truck tire manager E. J. Samuels, manager of the organization division, will go to New York to become manager of inside sales. Bruner has been

with Goodyear for over five years. He will be succeeded as manager of the service department by W. H. Sorn, at present assistant manager. Samuels has been with Goodyear since 1911.

George H. Strout has been appointed manager of the Eastern department of the Apperson Bros. Automobile Co. Strout has been in the Apperson family for many years. He has complete charge of the territory comprising the New England States, Eastern New York State and Northern New Jersey. Strout is also, and has been for some time, in complete charge of export business.

James T. Aubrey, western manager for the Cosmopolitan Magazine with headquarters in Chicago, has been selected to succeed H. H. Holmes as advertising manager of the Packard Motor Car Co. and will assume his duties April 1. He has had long experience in the advertising field and joined the Cosmopolitan staff upon his discharge from the army.

Lincoln T. Kauffmann has organized a company to act as selling representative for manufacturers of automotive equipment. Associated with him is Lewis M. Schwartz, who for ten years was advertising and sales manager for the Emil Grossman Mfg. Corp. of Brooklyn.

Alfred Reeves, general manager of the N. A. C. C., addressed a meeting of New England dealers at Boston, Tuesday night, on business prospects for 1921. He spoke before the Buffalo Rotary Club at noon to-day and will address the Buffalo Dealers' Association to-night.

Homer Hilton has been elected vice-president and general sales manager of the Winther Motor Truck Co., Kenosha, Wis. Hiton up to this time has been managing director of the National Association of Motor Truck Sales Managers.

J. C. Johnson has resigned his position in the purchasing department of the Maxwell Motor Co. Johnson formerly was in the purchasing department of the Briscoe Mfg. Co. in this city. He has not announced future plans

R. W. Stanley has been engaged by the receivers of the Owen Magnetic Motor Car Corp. as production engineer in charge of the Wilkes-Barre plant. He was formerly connected with General Electric Co.

James C. Griven has recently joined the forces of the Miller Rubber Co. as special Eastern representative, with headquarters in New York. Griven's connection with the rubber business dates from 1909.

R. F. Ohmer, sales manager of the Recording & Computing Machines Co., Dayton, Ohio, manufacturers of Ohmer Ignition, has organized a distributing sales company, with headquarters at Dayton.

Ralph Leavenworth, advertising manager of the Standard Parts Co., Cleveland, left that connection, March 15, to take the position of director of personnel with S. L. Weedon & Co., Cleveland.

Robert W. Boys has resigned as superintendent of the Goodyear Mills, Inc., subsidiary of the Goodyear Tire & Rubber Co., to accept a similar position with the Manhasset Mfg. Co., Putnam, Conn.

E. J. Herrmann has been appointed sales manager for the territory handled from the Indianapolis plant of the Martin-Parry Corp. Mark E. Hamer has been appointed advertising manager.

George E. Merryweather, president of the Motch & Merryweather Machinery Co., has become a member of the board of directors of the Davenport Machine Tool Co., Inc., Rochester.

L. J. Kramer has joined the sales force of the United States Motor Truck Co., Cincinnati. He has been connected with the truck business for some years, serving with Master and Republic.

George W. Ellis of the Supplee-Biddle Hardware Co., Philadelphia, has been appointed chairman of the Automobile Accessories Branch of the National Hardware Association.

Herman Alperin, formerly with the Cyphers Incubator Co. at Buffalo, has been made sales manager of the King Motor Car Co., recently purchased by C. A. Finnegan and his associates.

A. C. Immel, former superintendent of construction for Ford Motor Co., has joined the Columbia Body Co. of Detroit in the same capacity.

J. A. Cowles has severed his connection with the McVicker Engineering Co., Minneapolis.

S. Gordon Hyde has resigned as advertising manager of the Buda Co., Harvey, Ill.

## Chicago Finds Sales Very Brisk in City

CHICAGO, March 11.—The number of actual deliveries of new cars sold at retail during the first two months of this year was equal to that for the same period a year ago, and there appears to be no let-up in the demand for new cars by city buyers. The same condition does not hold in the wholesale trade—cars sold by the distributors to country dealers. There is little trade in the country and little hope of improvement until the farmers get to work.

But trade in the city is so good that dealers are asking if it is going to last—whether it does not constitute in a measure the business left over when the slump came last August. There were many prospects at that time in the mood for buying who were frightened off by general conditions and who, with the cut in Ford prices the following month, felt that they might as well wait a while to see how far prices would be cut.

The used car market is good; probably as good as it was in the first two months of last year.

The truck market is not good. Chicago profited slightly from the good roads show, but until business conditions throughout the city show a more appreciable improvement truck distributors do not see that there will be any forward movement in their lines.

#### SELLS 30 TRUCKS IN OHIO

DETROIT, March 16—Substantiating optimistic reports of improvement in the truck industry, the Commerce Motor Car Co. reports that one roadman brought in this week orders for 30 trucks from the Ohio territory, including 13 from Cleveland, nine from Columbus and six from Toledo. Factory production schedules are being increased daily and officers of the company declare prospects are bright for restoration of a norma! pre-war business by May 1.

# Calendar

#### SHOWS

- Mar. 19-26—Detroit, Annual Automobile Show, Detroit Automobile Dealers' Ass'n, Morgan-Wright Building.
- April 3-9—Denver, Annual Automobile Show, Auditorium.
- April 4-9—Seattle, Annual Automobile Show, Seattle Motor Car Dealers' Ass'n, Arena Hippodrome.

#### FOREIGN SHOWS

- Mar. 23-28—Witwatersrand Agricultural Show including machinery and motors sections.
- April, 1921—Sofia, Bulgaria, Tractor Trials, under the Bulgarian Ministry of Agriculture.
- Apr. 20 May 5 Mexico City, Mexican Automobile Show, National Theatre Bldg.

- May 28, 1921 Czecho-Slovak International Automobile Exposition of Cars, Trucks, Tractors, Motorcycles and Equipment.
- May 28-June 8—International Automobile Exhibition, Basle, Switzerland.
- June, 1921—Reykjavik, Iceland.
  Agricultural Exhibition—
  Agricultural Machinery—
  Icelander Agricultural Society, Reykjavik, Iceland.
- Oct. 5-16—Paris, France, Paris Motor Show, Grand Palais, Administration de l'Exposition Internationale de l'Automobile, 51, Rue Per-
- golèse, Paris.

  Nov. 4-12 London, British
  Motor Show, Society
  Motor Mfrs. and Traders.

#### CONVENTIONS

May 4-7 — Cleveland, National Foreign Trade Council.

- May 17-19—Buffalo, Convention of Factory Service Managers, Auspices of Service Committee, N. A. C. C.
- May 24-28 West Baden, Ind., Summer Meeting Society of Automotive Engineers, West Baden Springs Hotel.
- Oct. 12-14, 1921—Chicago Twenty-eighth Annual Convention National Implement & Vehicle Ass'n.

#### RACES

- June 18—Uniontown, Pa., Speedway Events. July 24—Grand Prix, Le Mans.
- Labor Day—Uniontown, Pa., Autumn Classic.

#### S. A. E. MEETINGS

Buffalo section—April 19—Paper on "Carbureter Performance," by F. C. Mock. Dayton section — March 22 — Symposium on Post War Aeronautical Progress.

#### Dayton section-May 3.

- Detroit section—March 25—Discussion of "The Relation Between the Industry and the Department of Engineering Research of the University of Michigan," by Prof. E. A. White. Detroit Board of Commerce.
- Metropolitan section—April 14

  —Paper on "Low Grade
  Fuel Carburetion," by A.
  H. Beach.

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- Minneapolis section April 6 Discussion of repair equipment.
- Washington section—April 1— Aeronautical Engineering Session.

## Obregon Takes Position as Mexican Show Head

NEW YORK, March 14—The presidency of the forthcoming automotive show in Mexico City, which will be held in the new National Theater from April 20 to May 5, has been accepted by General Obregon, president of the Mexican Republic. General Obregon, in accepting the honor, came out strongly in favor of the good roads movement which is being inaugurated by the dealers and automotive interests of Mexico.

Information reaching New York, both from Mexico City and from the manufacturers of automotive equipment in the United States, lends weight to the belief that the exhibition will be satisfactory from every standpoint. Many manufacturers of cars, trucks, tractors, accessories and equipment, have signified their intentions of being represented and in the last few days a number of special exhibits for the show have gone forward.

The importance of the show is twofold. Mexico at this time is one of the few foreign countries which has not suffered seriously in the present business depression. Secondly, the Mexican show is among the first in the Spanish-American countries in which the manufacturers of North America have cooperated strongly. Several other showings have been held in South America but they have received but scant attention from manufacturers.

## To Make Special Survey of Bethlehem Affairs

NEW YORK, March 16—Edward F. McGuire, vice-president of George W. Goethals & Co., an experienced automobile and industrial organizer, has been appointed to make a fresh survey of the affairs of the Bethlehem Motors Corp. He will act with Clinton E. Wood, the receiver. If McGuire deems it advisable he will undertake a vigorous selling policy looking toward the liquidation of the trucks on hand within the next three

months and will report back to the creditors his conclusions as to the most advantageous course to pursue in reference to the future conduct of the company.

A committee of Bethlehem Motors stockholders, headed by B. W. Jones, has sent a letter to stockholders urging them to deposit their stock under a protective agreement in the hope that if conditions in the industry show a marked change for the better in the near future and that if adequate working capital can be obtained, a reorganization or adjustment will improve materially the present situation of the stockholders.

# Mid-West Section S. A. E. Studies Ansted Engine

CHICAGO, March 12-At the meeting of the Mid-West Section of the S. A. E., Chester S. Ricker and John Moore, consulting engineer and chief engineer, respectively, for the Lexington Motor Car Co., presented a paper on the design of valve gear and engine design as applied to the new Ansted engine used exclusively in the Lexington car. The paper was supplemented with moving pictures showing the unique production methods used in the construction of the engine. The "rocking chair" valve motion for the operation of the overhead valves was explained by the use of an animated moving picture.

The results of a complete set of tests on the road and re-run on the dynamometer under duplicated road conditions were also presented with the aid of graphic charts. One consideration, the presence of several humps in the vacuum lines showing manifold depressions, was the cause of a long discussion. Mr. Purdy of the Rayfield Carbureter Co., proposed several possible reasons, but by a series of illustrative examples showed that these reasons were without grounding, and therefore valueless.

The meeting was one of the best attended that the Mid-West section has ever had, about 125 members and their friends being present.

## Wood Accepts Challenge for Motor Boat Cup Race

DETROIT, March 15—"Gar" Wood has accepted the challenge cabled by the Royal Motor Yacht Club for the Harmsworth Trophy. This guarantees the holding of the foremost motor boat racing fixture during the coming season. For the first time in the history of international motor boat racing the contest will be held on inland waters, as the Motor Boat Club of America, the recognized club in the United States governing B. I. T. matters, has awarded the contest to the Detroit Yacht Club. The race will be held in the protected waters of Lake St. Clair or on the Detroit River on Sept. 3, 5 and 6.

The British International Trophy event will follow the American Power Boat Association's race for the Gold Cup and One Mile Championships of North America, which will be held on Aug. 27, 29, 30 and 31. At the same time will be held the first of the new Wood-Fisher Trophy races for displacement boats under 32 feet in length equipped with any type of motor of a piston displacement not exceeding 2150 cubic inches.

# Atlanta Show Brings Southern Sales Spurt

ATLANTA, March 12-At least 150 sales were made in Atlanta this week, many of which resulted directly from the automobile show. Of this number about 50 were retail sales while many of the others were sales to new dealers secured throughout the southeastern territory by Atlanta distributors exhibiting at the show. The most important feature of the show lies in the fact that it has brought the dealers back to optimism not only because of the actual sales that were made, but because the public displayed real interest for the first time in months and hundreds of prospects were obtained. Hundreds of dealers from the smaller towns visiting the show left imbued with greater enthusiasm.